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Tennessee Valley
Authority



State of Tennessee



Draft Environmental Impact Statement

1996 Olympic Whitewater Slalom Venue
Ocoee River, Polk County, Tennessee
Ocoee Ranger District
Cherokee National Forest

**United States
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Agriculture**



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ENVIRONMENTAL IMPACT STATEMENT

1996 OLYMPIC WHITEWATER SLALOM VENUE OCOEE RIVER, POLK COUNTY, TENNESSEE OCOEE RANGER DISTRICT CHEROKEE NATIONAL FOREST

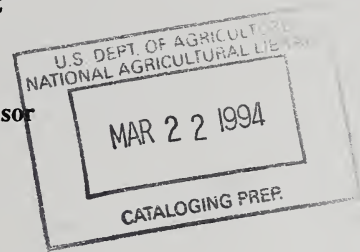
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Abstract:

Three alternatives and a no action alternative are described and their effects evaluated. Alternative 1 would develop the Olympic Venue on the site and remove all facilities after Olympic events, returning the site to current conditions. Alternative 2 would retain the competitive channel, day use building, upper bridge and some support facilities after the Olympic events. Alternative 3 - Proposed Action would retain the competitive channel, a larger day use building, upper bridge, and lower bridge to be constructed after the Olympic event, and some support facilities after the Olympic events. The no action alternative would result in no change to baseline conditions at the site, other than changes due to normal increased usage.

Comments:

Reviewers should provide the Forest Service with their comments during the review period of the draft environmental impact statement. This will en-

able the Forest Service to analyze and respond to the comments at one time and to use information acquired in the preparation of the final environmental impact statement, thus avoiding undue delay in the decisionmaking process. Reviewers have an obligation to structure their participation in the National Environmental Policy Act process so that it is meaningful and alerts the agency to the reviewers' position and contentions. *Vermont Yankee Nuclear Power Corp. v. NRDC*, 435 U.S. 519, 553 (1978). Environmental objections that could have been raised at the draft stage may be waived if not raised until after completion of the final environmental impact statement. *City of Angoon v. Hodel* (9th Circuit, 1986) and *Wisconsin Heritages, Inc. v. Harris*, 490 F. Supp. 1334, 1338 (E.D. Wis. 1980). Comments on the draft environmental impact statement should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 CFR 1503.3).

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SUMMARY

SUMMARY

A. PROPOSED ACTION

The Forest Service proposes, on behalf of the State of Tennessee, to design and construct facilities needed to operate a canoe and kayak whitewater course on the Ocoee River, Polk County, Tennessee. The course would be the site of the Whitewater Slalom Venue of the 1996 Summer Olympic Games being hosted by the City of Atlanta, Georgia. In addition to the physical development of the course within the channel of the Ocoee River, proposed improvements consist of program facilities required by the Atlanta Committee for the Olympic Games (ACOG) to hold the event. Required program elements include access to both sides of the river, visitor administrative and support facilities, spectator viewing areas, athlete rest, comfort areas, and other facilities.

B. PURPOSE AND NEED FOR ACTION

In 1989, the U.S. Canoe and Kayak Team provided the Atlanta Organizing Committee with a proposal to use the Ocoee River as the site of the 1996 Olympic whitewater canoe and kayak competition. Other rivers in the southeastern United States, including the Chattahoochee and Chattooga Rivers in Georgia and the Nantahala and French Broad Rivers in North Carolina, were considered for the event by the U.S. Canoe and Kayak Team but were rejected as potential sites for several reasons, including being further than 2 hours driving time from Atlanta, inability to regulate flows, and being designated Wild and Scenic River. Among the reasons contributing to the U.S. Canoe and Kayak Team's selection of the upper Ocoee River were less traffic congestion, ability to locate most of the facilities above the floodplain, and less effect on existing commercial and recreational whitewater use.

C. PROJECT AREA

The proposed course is located within the Cherokee National Forest (CNF) on the Ocoee Ranger District, Polk County, Tennessee about 28 miles east of Cleveland, Tennessee. U.S. Highway 64 provides access to the area. The whitewater course is proposed for a 400 to 600-meter-long section of the Ocoee River between TVA Dam No. 3 and Dam No. 2. The proposed whitewater course would be located about 1.1 river miles above Power House No. 3, immediately below the area known as the "Blue Hole". This section of the Ocoee River has very low flow because of water diversion for power generation at TVA-operated Power House No. 3. Water present within the main channel is attributed mainly to small inflows from tributary drainages. Figure S.C.-1 illustrates the location of the Olympic Venue.

D. ISSUES

Issues relating to nine resource categories were identified during the public meeting and scoping process. The scoping process began informally with a meeting held by the State of Tennessee on December 9, 1991 in Cleveland, Tennessee and culminated with the formal Scoping Meeting held in Benton, Tennessee on October 26, 1992.

Issues as defined under 40 CFR 1501.7(a)(2) were a basis for developing the alternatives considered in the EIS. Significant issues addressed in the EIS include:

Air Quality

- What are the effects on air quality within the Little Frog Wilderness?

Traffic and Transportation

- What are the effects of the proposed action on U.S. Highway 64 local vehicular travel and public safety?
- What are the effects of parking facilities and potential methods of public transport such as shuttle buses on regional thoroughfares and public safety?

Socioeconomics

- What are the short-term and long-term effects on the local and regional demographics and economies?
- What are the effects on TVA in terms of potential power generation reduction and related revenue changes?

Recreation

- What are the effects on present outfitters, guides and river users?
- What are the effects on the "Blue Hole" and local recreational facilities and opportunities?
- What are the long-term effects of maintaining a whitewater course on active and passive recreation use?
- What are the effects on the adjacent Little Frog Wilderness and the wilderness experience?

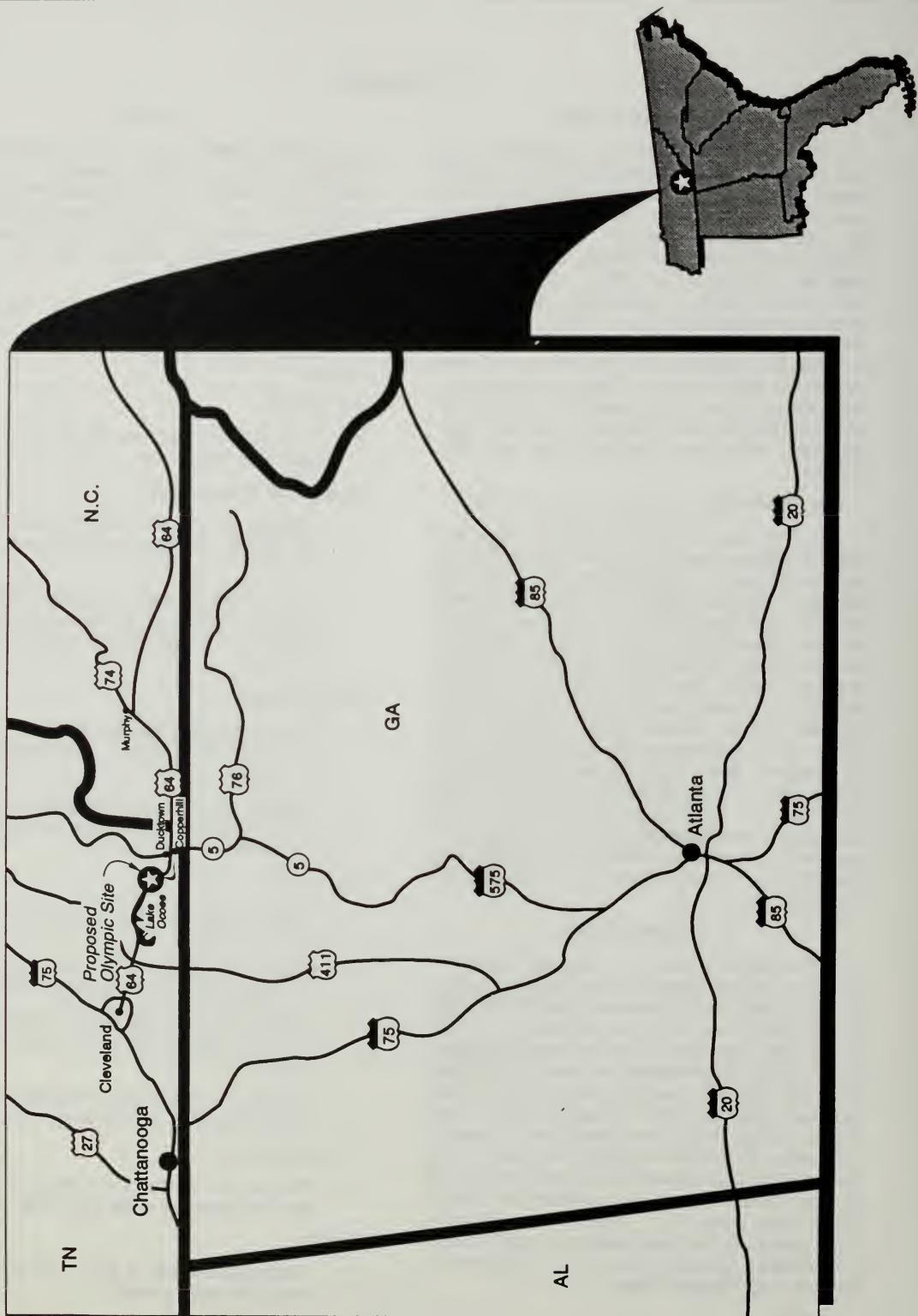
Visual Resources

- What are the effects of the proposed action on the visual resources of the study area?

Geology

- What are the effects of acidic geological formations in the project area?

Figure I. S.C.-1
1996 Proposed Olympic Venue



- What are the effects of the proposed action on mineral rights and sand and gravel deposits in the area?

Hydrology

- What are the effects on availability of water for power generation?
- What are short-term and long-term effects of the proposed action on water quality and stream channel stability?

Biological Resources

- What are the short-term and long-term effects on fish and wildlife habitats, threatened and endangered species, and wetland resources?

Cultural Resources

- What are the effects of the proposed action on cultural resources?

Facilities

- What are the on-site, short-term and long-term effects on sewage and solid waste collection, treatment, and disposal, and what are the effects on local infrastructure?
- What are the short-term and long-term effects of facilities in the Ocoee River floodplain?

E. PUBLIC INVOLVEMENT

On December 9, 1991, the State of Tennessee hosted an informal meeting to discuss the Olympic proposal and to seek input on potential issues and concerns with the proposed project. This meeting helped focus the State's proposal for submission to the Forest Service. Upon receiving the State's proposal, the Forest Service began the scoping process.

In accordance with NEPA requirements, the lead agency (i.e., the Forest Service) is required to publish a Notice of Intent (NOI) in the *Federal Register* as soon as practicable after a decision is made to prepare an EIS (40 CFR 1501.7). The NOI must precede the scoping process. The NOI for this EIS was published in the *Federal Register* on May 29, 1992.

On October 11, 1992, public notice of a scoping meeting to be held on October 26, 1992, was published in newspapers in the cities of Asheville, North Carolina, and Chattanooga, Johnson City, and Knoxville, Tennessee. In addition local news releases were published, and approximately 1,000 letters of invitation were mailed requesting public input on the EIS process, and announcing the date and location of the scoping meeting.

The scoping meeting was held from 5 p.m. to 9 p.m. on October 26, 1992, at Benton Elementary School in Benton, Tennessee. Attendance at the

scoping meeting included Interdisciplinary (ID) Team personnel; representatives of Federal, State, and local agencies; organizations; and individuals having an interest in the project. Approximately 45 people attended the meeting. Each person in attendance wishing to voice an opinion or identify an issue was provided with a comment sheet and encouraged to respond prior to leaving the meeting, or to mail comments prior to the end of the scoping period.

F. FOREST PLAN CONSISTENCY

To assess consistency with the Forest Land and Resource Management Plan (FLRMP), each of the alternatives were compared to FLRMP goals, objectives, standards, and management guidelines.

G. ALTERNATIVES CONSIDERED IN DETAIL

Three alternatives were developed to respond to the State of Tennessee and the International Olympic Committee's request of the Forest Service to hold the Olympic whitewater events on the Ocoee River. These alternatives are consistent with the Olympic Venue program issued by ACOG. The alternatives development process was based upon a rigorous evaluation of comments received throughout the scoping process. Each of the alternatives considered in depth the potentially significant issues raised during scoping, and were designed to minimize adverse effects on potentially affected resource categories. Each alternative includes specific features which address one or more of the issues identified during the scoping process. In addition, a fourth alternative, that of no action, was also evaluated. The no-action alternative assumes a continuation of baseline conditions and serves as a basis for evaluating facility emplacement. Table S.G-1 provides a comparison of facilities proposed for each alternative.

Alternative 1

In Alternative 1, all ACOG facilities and artificial elements of the competitive channel would be removed after the event. The site would be returned to near-baseline conditions. The existing parking facilities on the right bank would be the only facility slated to remain following the 1996 Olympic events. Under this alternative, future competitive use of this segment of the River is not anticipated.

The architectural elements for this alternative would consist of prefabricated and site-assembled components that would be erected for the venue, then removed following conclusion of the Olympic events. The shelters, platforms, and tents would accommodate venue participants, venue facilitators, and venue spectators.

Temporary structures consisting primarily of fabric or tent-like shelters would serve to protect, contain, and screen certain functions that would be

**Table S.G-1
Alternatives Comparison - Facilities**

FACILITY	ALT 1		ALT 2		ALT 3		NO ACTION	
	RB	LB	RB	LB	RB	LB	RB	LB
Broadcast Compound	T	N	N	T	N	T	N	N
ACOG/Event Management	N	T	N	T	P	T	N	N
Doping Control	N	T	N	T	N	T	N	N
Boat Control	N	T	N	T	N	T	N	N
TV Media Observer	T	T	T	T	T	T	N	N
Awards Stand/Flags	N	T	N	T	N	P	N	N
Timing/Scoring	N	T	P	T	P	P	N	N
Media Food	T	N	N	T	N	T	N	N
Photo Processing	T	N	N	T	N	T	N	N
Interview Room	T	N	N	T	N	T	N	N
Workroom	T	N	N	T	P	T	N	N
Results hardware	N	T	P	T	P	T	N	N
Results Input	N	T	P	T	P	T	N	N
Scoreboard(s)	T	T	T	T	T	T	N	N
Scoreboard Operator	N	T	N	T	P	T	N	N
Media Lounge	T	N	N	T	N	T	N	N
Media Control	T	N	T	T	T	T	N	N
Mixed Zone	N	T	N	T	N	T	N	N
Athlete Lounge	T	N	N	T	N	T	N	N
Athlete Tents/Meditation	T	N	N	T	N	T	N	N
Athlete Changing	T	N	N	T	P	T	N	N
Athlete Sports Medicine	T	N	N	T	P	T	N	N
Athlete Food	T	N	N	T	N	T	N	N
Boat Repair/Storage	T	N	N	T	P	T	N	N
Public Gate/Booth	T	N	T	N	T	N	N	N
Security Facility	T	N	T	N	P	N	N	N
Staff Food	T	N	T	N	P	N	N	N
Spectator Seating	T	N	T	N	P/T	N	N	N
Concessions/Vendors	T	N	T	N	T	N	N	N
Terracing	N	N	P	N	P	N	N	N
Public Information	T	N	T	N	P/T	N	N	N
Medical/First Aid	T	N	T	T	P	T	N	N
Parking	P	N	P	N	P	N	N	N
Service Building	N	N	P	N	P	N	N	N
Picnicking	N	N	N	N	P	P	N	N
VIP Entry	T	N	T	N	T	N	N	N
VIP Facilities	T	N	P	N	P	N	N	N
Toilet Facilities	T	T	P/T	T	P/T	P/T	N	N
Competitive Channel	T	T	P	P	P	P	N	N
Lower Bridge	T	T	T	T	P/T	P/T	N	N
Upper Bridge	T	T	P	P	P	P	N	N

T - Temporary
 P - Permanent
 N - Not Present
 RB - Right Bank
 LB - Left Bank

required only for the Olympic events. While the design and theme of these structures would be dictated by ACOG, the location and arrangement would be a coordinated effort in order to maximize their function and efficiency.

These temporary shelters would consist of enclosures for venue officials, a start shack, a finish/timing shack, media platforms, judges platforms, athlete accommodations, vendors enclosures, ticket and security check points, screening of comfort stations, and VIP areas. A temporary bridge would be placed just above the "Blue Hole" to provide service personnel, officials, and athletes access to the left bank. Spectator seating would consist of a series of temporary bleachers fabricated on-site on temporary foundations. Wooden walkways from the bleachers to the original river bank would be constructed over the existing riverbed to allow ease of spectator movement to the closed portion of U.S. Highway 64 where concessions and comfort stations would be located.

A day use area for VIPs, family, officials, and other special guests would be located in a partially cleared area adjacent to U.S. Highway 64, just below the officials parking area, above the river channel.

Alternative 2

Alternative 2 would permit post-Olympic competitive use of the site. Alternative 2 serves as a median between two spectrums. At one end of the spectrum is Alternative 1 which is no post-Olympic use of the site; Alternative 3 would allow post-Olympic competitive use.

The architectural elements for Alternative 2 would consist of a combination of temporary and permanent structures. These shelters, platforms, and buildings would accommodate the same three primary venue user groups as described for Alternative 1.

The temporary structures, consisting primarily of fabric or tent like shelters, would serve to protect, contain, and screen certain functions that would be required only for the Olympic events.

These temporary shelters would consist of enclosures for venue officials, a start shack, a finish/timing shack, media platforms, judges platforms, athlete accommodations, vendor enclosures, ticket and security check points, screening of comfort stations, and some VIP seating areas. The spectator seating would consist of a series of temporary bleachers fabricated on-site on temporary concrete foundations. These bleachers would be located on terraces that would provide additional spectator seating over the existing riverbed on fill material adjacent to the river channel.

Permanent facilities or structures would include the competitive channel, an upper bridge to the left bank, utilities that could be accessed for future white-

water activities, the small parking area adjacent to U.S. Highway 64 where the existing pull-off occurs, and a day use building to be located on the knoll just above the Old Copper Road and the "Blue Hole."

Alternative 3 - Proposed Action

Alternative 3 also would provide for post-Olympic competitive use of the site within strict naturalistic design constraints. Many of the ACOG programmed facilities would remain after the event for utilization by the Forest Service.

The architectural elements for this alternative consist of a combination of temporary and permanent structures. These shelters, platforms, and buildings will accommodate the same three primary groups of Olympic Venue users described for Alternative 1.

Temporary structures, consisting primarily of fabric or tent like shelters, would serve to protect, contain, and screen certain functions that would be required only for the Olympic events. These temporary structures and shelters would be the same as those discussed under Alternative 2. Handling of spectators is a significant difference between Alternative 3 and Alternative 2. Whereas Alternative 2 confines all 15,000 spectators to assigned stadium seats, Alternative 3 emphasizes spectator circulation over seating. Roughly one-half the 15,000 capacity is still accommodated by temporary structural seating, while the balance of the capacity is accommodated by a system of raised earth and rock terraces adjacent to the competitive channel on the right bank.

Permanent facilities would support and serve the particular needs of the Olympic event and would be retained after the Olympics to serve the on-going needs of National Forest users. These permanent facilities and structures would include the competitive channel, the upper bridge, utilities that could be accessed for future whitewater activities, a small parking area adjacent to U.S. Highway 64 where the existing pull off occurs, and an expanded day use building located on the knoll just above Old Copper Road and the "Blue Hole."

A lower pedestrian bridge would be erected after the event to allow permanent access to the left bank. This bridge would facilitate access to the left bank near the finish area and provide an alternative to traveling the Old Copper Road to the upper bridge.

Alternative 4 - No Action

The No-Action Alternative assumes that the Olympic event would not be held on the Ocoee River. Under this scenario, no development within or adjacent to the river would occur, and baseline conditions would prevail.

H. MITIGATION

Mitigation measures were developed by the ID Team in response to 40 CFR 1502.14(f) and 1508.20 to minimize or eliminate effects associated with each of the alternatives considered. These measures are discussed in detail in Chapter IV of this EIS, and are presented by resource category.

I. PREFERRED ALTERNATIVE

At this early stage the cooperating agencies have not identified a preferred alternative.

J. COMPARISON OF ALTERNATIVES BY ISSUE/RESOURCE CATEGORY

Effects of the alternatives on each of the specific issues/resource categories identified as a result of the scoping process (Chapter I) are summarized in Table S.J.-1. Also included in this table is the assessment of effects on resource categories relevant to the proposed project, but not specifically identified as issues during the scoping process. The magnitude and significance of these effects are discussed in detail in Chapter IV.

K. AFFECTED ENVIRONMENT

The scoping process resulted in the identification of issues of environmental concern associated with development of the Olympic Venue. These issues were grouped by resource category for analysis by the ID Team. For each resource category, a Region of Influence (ROI) was defined. This is the area most likely to be affected by implementation of proposed project alternatives. Baseline conditions were developed to be reflective of the ROI for each resource category considered. The following is a discussion of baseline conditions within each affected resource category for which issues were identified during the scoping process.

Air Quality

The proposed Olympic Venue is located in the EPA-designated Eastern Tennessee - Southwestern Virginian Interstate Air Quality Control Region (AQCR). Tennessee has developed a state implementation plan (SIP) to provide for the implementation, maintenance, and enforcement of air quality standards. Incorporated within the SIP are regulations that prohibit pollution from new or modified emission sources that would interfere with attainment and maintenance of air quality standards. Under these regulations, states are required to determine whether the construction or modification of any source or facility would cause or contribute to a violation of any ambient air quality standard, or interfere with reasonable further progress toward attainment of ambient air quality standards.

The major sources of air pollution within Polk County are industry, transportation, construction,

utilities, and natural sources such as pine trees in the area (biogenic VOC emissions), forest fire smoke and ash, wind erosion, and plant pollen (Berger, no date).

Local sources of air pollution specific to the proposed Olympic Venue area include motor vehicle exhaust from cars, trucks and buses and the presence of parking and support areas. These sources emit various pollutants to the atmosphere, including nitrogen oxides (NO_x), SO_x, CO, particulates, and hydrocarbons (HC). Mobile sources include automobiles and buses that will service the proposed Olympic Venue.

Traffic and Transportation

The transportation analysis focuses on U.S. Highway 64, the primary arterial serving the proposed 1996 Olympic Venue. U.S. Highway 64 parallels the Tennessee/Alabama, Tennessee/Georgia, and North Carolina/South Carolina borders as it travels through Tennessee and North Carolina. In the vicinity of the Olympic site, U.S. 64 intersects I-75 in Cleveland, U.S. 411 near Ocoee, Tennessee, and U.S. 19 to the west of Murphy, North Carolina.

U.S. Highway 64 is used for a variety of purposes in the region. Whitewater outfitters use the road to transport busloads of raft and kayak patrons to various points on the Ocoee River. Heavy trucks use the route for transporting lumber and other products through southern Tennessee. Toxic materials are transported by truck on U.S. Highway 64 from manufacturing plants located south of Ducktown. Tourists use U.S. Highway 64 to access the Great Smoky Mountain National Park and other attractions in the area. It also serves as a major east-west route for local traffic in Polk County. The section of U.S. Highway 64 to the east of U.S. 411 is also designated as a National Forest Scenic Byway. This route is the first National Forest Scenic Byway designated in the United States.

The evaluation of existing conditions focuses on the carrying capacity of the existing U.S. Highway 64 road alignment, the level of service (LOS) of U.S. Highway 64, and accident statistics associated with the facility.

Historic traffic counts were analyzed to determine vehicular traffic rate of increase for U.S. Highway 64 traffic over the last 6 years. The analysis indicated that traffic has grown an average of 3 percent annually during that period. Existing traffic volumes on U.S. Highway 64 range from 406 vehicles per hour in the Ocoee Gorge area to 1,285 vehicles per hour to the west of U.S. 411. Existing LOS varies considerably along the route. The multi-lane sections east of Cleveland and west of Ducktown operate at free flowing conditions (LOS A, B, and C), while the two

Table S.J-1
Alternative Comparison Matrix¹

Resource Category	Alternative 1	Alternative 2	Alternative 3 Proposed Action	Alternative 4 No-Action
1. Air Quality	<ul style="list-style-type: none"> Fugitive dust from construction Vehicle engine combustion 	<ul style="list-style-type: none"> Fugitive dust from construction Vehicle engine combustion 	<ul style="list-style-type: none"> Fugitive dust from construction Vehicle engine combustion 	<ul style="list-style-type: none"> No effect Vehicle engine combustion
2. Traffic and Transportation	<ul style="list-style-type: none"> Limited on-site parking Level of Service decrease Bus-tractor trailer conflicts 43 autos/6 trucks on U.S. 64 west during peak hour 4,800 truckloads of spoil during reconditioning 	<ul style="list-style-type: none"> Limited on-site parking Level of Service decrease Bus-tractor trailer conflicts 57 autos/12 trucks on U.S. 64 west during peak hour 650 truckloads of spoil during reconditioning 	<ul style="list-style-type: none"> Limited on-site parking Level of Service decrease Bus-tractor trailer conflicts 61 autos/15 trucks on U.S. 64 west during peak hour 0 truckloads of spoil during reconditioning 	<ul style="list-style-type: none"> Traffic increase above baseline. Level of Service decrease No effect No effect No effect
3. Noise	<ul style="list-style-type: none"> Temporary increase during construction and operation of event 	<ul style="list-style-type: none"> Temporary increase during construction and operation of event 	<ul style="list-style-type: none"> Temporary increase during construction and operation of event 	<ul style="list-style-type: none"> No effect
4. Socioeconomics ⁽²⁾ (Construction)	<ul style="list-style-type: none"> Net local fiscal effect - \$97,000⁽³⁾ \$3.1 million increase in local sales 159 additional jobs Population increase - 72 	<ul style="list-style-type: none"> Net local fiscal effect - \$131,000 \$4.1 million increase in local sales 215 additional jobs Population increase - 98 	<ul style="list-style-type: none"> Net local fiscal effect - \$139,000 \$4.4 million increase in local sales 227 additional jobs Population increase - 103 	<ul style="list-style-type: none"> No effect No effect No effect No effect
Socio-economics (Operation)	<ul style="list-style-type: none"> Net local fiscal effect - \$46,000 \$16.9 million increase in retail sales 145 additional jobs Population increase - 0 	<ul style="list-style-type: none"> Net local fiscal effect - \$46,000 \$16.9 million increase in retail sales 145 additional jobs Population increase - 0 	<ul style="list-style-type: none"> Net local fiscal effect - \$46,000 \$16.9 million increase in retail sales 145 additional jobs Population increase - 0 	<ul style="list-style-type: none"> No effect No effect No effect No effect
5. Land Use (Operations)	<ul style="list-style-type: none"> Compatible with land use regulations Slightly incompatible with existing recreational character Compatible with transportation uses 	<ul style="list-style-type: none"> Compatible with land use regulations Slightly incompatible with existing recreational character Compatible with transportation uses 	<ul style="list-style-type: none"> Compatible with land use regulations Slightly incompatible with existing recreational character Compatible with transportation uses 	<ul style="list-style-type: none"> Compatible with land use regulations Compatible with existing recreational character Compatible with transportation uses
Land Use (Immediate Post-Olympic)	<ul style="list-style-type: none"> Compatible with land use regulations Compatible with recreational use Compatible with transportation uses 	<ul style="list-style-type: none"> Compatible with land use regulations More intensive recreational use More intensive use of transportation facilities 	<ul style="list-style-type: none"> Compatible with land use regulations More intensive recreational use More intensive use of transportation facilities 	<ul style="list-style-type: none"> Compatible with land use regulations Compatible with recreational use Compatible with transportation uses

**Table S.J.-1
Alternative Comparison Matrix - Continued**

Resource Category	Alternative 1	Alternative 2	Alternative 3 Proposed Action	Alternative 4 No-Action
6. Public Facilities (Public Safety)	<ul style="list-style-type: none"> Minimal effect on law enforcement Minimal effect on fire protection Minimal effect on medical services 	<ul style="list-style-type: none"> Minimal effect on law enforcement Minimal effect on fire protection Minimal effect on medical services 	<ul style="list-style-type: none"> Minimal effect on law enforcement Minimal effect on fire protection Minimal effect on medical services 	<ul style="list-style-type: none"> No effect No effect No effect
Public Facilities (Utilities)	<ul style="list-style-type: none"> No significant effect on education No effect on local water supply Minimal effect on off-site wastewater systems Minimal effect on local landfills No effect on local power/telecommunications 	<ul style="list-style-type: none"> No significant effect on education No effect on local water supply Minimal effect on off-site wastewater systems Minimal effect on local landfills No effect on local power/telecommunications 	<ul style="list-style-type: none"> No significant effect on education No effect on local water supply Minimal effect on off-site wastewater systems Minimal effect on local landfills No effect on local power/telecommunications 	<ul style="list-style-type: none"> No effect No effect Minimal effect on off-site wastewater systems No effect No effect
7. Recreation	<ul style="list-style-type: none"> Temporary loss of 3 recreation opportunities Gain of 2 recreation opportunities Temporary recreation experience ROS condition 17/56(4) Long-term recreation experience ROS condition 0/28(+) 	<ul style="list-style-type: none"> Temporary loss of 3 recreation opportunities Gain of 5 recreation opportunities Temporary recreation experience ROS condition 17/56 Long-term recreation experience ROS condition 2/28 	<ul style="list-style-type: none"> Temporary loss of 3 recreation opportunities Gain of 9 recreation opportunities Temporary recreation experience ROS condition 17/56 Long-term recreation experience ROS condition 2/28 	<ul style="list-style-type: none"> No effect No effect No effect No effect
8. Visual	<ul style="list-style-type: none"> 1 viewshed affected No scenic resources affected No architectural forms affecting site 	<ul style="list-style-type: none"> 2 viewsheds affected 1 scenic resource affected 2 architectural forms affecting site 	<ul style="list-style-type: none"> 2 viewsheds affected 1 scenic resource affected 3 architectural forms affecting site 	<ul style="list-style-type: none"> No effect No effect No effect
9. Geology and Soils	<ul style="list-style-type: none"> Maximum of 7.2 acres of vegetation cleared Grading - 3,550 cy Earth fill - 4,050 cy Limestone fill - 60,800 tons Boulders collected from riverbed - 12,000 tons Post-Olympic material mobilization - 72,000 cy 	<ul style="list-style-type: none"> Maximum of 10.2 acres of vegetation cleared Grading - 13,926 cy Earth fill - 9,124 cy Limestone fill - 118,900 tons Boulders collected from riverbed - 12,400 tons Post-Olympic material mobilization - 10,000 cy 	<ul style="list-style-type: none"> Maximum of 12.5 acres of vegetation cleared Grading - 11,730 cy Earth fill - 8,474 cy Limestone fill - 149,300 tons Boulders collected from riverbed - 12,400 tons Post-Olympic material mobilization - 10,000 cy 	<ul style="list-style-type: none"> No effect No effect No effect No effect No effect No effect

Table S.J.-1
Alternative Comparison Matrix - Continued

Resource Category	Alternative 1	Alternative 2	Alternative 3 Proposed Action	Alternative 4 No-Action
10. Hydrology	<ul style="list-style-type: none"> No decrease in ground permeability/increase in runoff from baseline Decrease in water availability from Ocoee No. 3 Reservoir - 6.7% Increase in maximum water depth 46% above baseline Expected pH (construction/reconditioning) 6.34 - 6.35 Increase in suspended solids during construction: 28% above baseline Increase in suspended solids during reconditioning: 399% above baseline 	<ul style="list-style-type: none"> Decrease in ground permeability/increase in runoff - 2.6% above baseline Decrease in water availability from Ocoee No. 3 Reservoir - 6.7% Increase in maximum water depth 46% above baseline Expected pH (construction/reconditioning) 6.32 - 6.34 Increase in suspended solids during construction: 85% above baseline Increase in suspended solids during reconditioning: 54% above baseline 	<ul style="list-style-type: none"> Decrease in ground permeability/increase in runoff - 6.4% above baseline Decrease in water availability from Ocoee No. 3 Reservoir - 6.7% Increase in maximum water depth 46% above baseline Expected pH (construction/reconditioning) 6.32 - 6.37 Increase in suspended solids during construction: 74% No increase in suspended solids during reconditioning 	<ul style="list-style-type: none"> No effect No effect No effect No effect No effect No effect
11. Aquatic	<ul style="list-style-type: none"> Minimal effects on downstream biota Minimal modification to substrate availability for benthic organisms 	<ul style="list-style-type: none"> Minimal effects on downstream biota Significant modification to substrate availability for benthic organisms 	<ul style="list-style-type: none"> Minimal effects on downstream biota Significant modification to substrate availability for benthic organisms 	<ul style="list-style-type: none"> No effect No effect
12. Wildlife	<ul style="list-style-type: none"> Minimal adverse effects Riparian wildlife species habitat lost - 7.2 ac 	<ul style="list-style-type: none"> Minimal adverse effects Riparian wildlife species habitat lost - 10.2 ac 	<ul style="list-style-type: none"> Minimal adverse effects Riparian wildlife species habitat lost - 12.5 ac 	<ul style="list-style-type: none"> No effect No effect
13. Vegetation	<ul style="list-style-type: none"> Partial loss of habitat in stand 1 - compartment 320; minimal effects to stands 2 and 3 Some loss of habitat in stands 11 and 9 - compartment 330 Some loss of habitat in stands 11 and 29 - compartment 364 	<ul style="list-style-type: none"> Partial loss of habitat in stand 1 - compartment 320; minimal effect to stands 2 and 3 Some loss of habitat in stands 11 and 9 - compartment 330 Some loss of habitat in stands 11 and 29 - compartment 364 	<ul style="list-style-type: none"> Partial loss of habitat in stand 1 - compartment 320; minimal effects to stands 2 and 3 Some loss of habitat in stands 11 and 9 - compartment 330 Some loss of habitat in stands 11 and 29 - compartment 364 	<ul style="list-style-type: none"> No effect No effect No effect

Table S.J.1-1
Alternative Comparison Matrix - Continued

Resource Category	Alternative 1	Alternative 2	Alternative 3 Proposed Action	Alternative 4 No-Action
14. Threatened and Endangered Species (TES)	<ul style="list-style-type: none"> Federal TES plant species adversely affected - 0 Candidate federally listed TES plant species adversely affected - 0 Sensitive plant species adversely affected - 3 Federally listed TES animal species adversely affected - 0 Candidate federally listed TES animal species adversely affected - 0 Sensitive animal species adversely affected - 0 Sensitive species habitat destroyed <1 ac Sensitive species habitat altered <1 ac 	<ul style="list-style-type: none"> Federal TES plant species adversely affected - 0 Candidate federally listed TES plant species adversely affected - 0 Sensitive plant species adversely affected - 3 Federally listed TES animal species adversely affected - 0 Candidate federally listed TES animal species adversely affected - 0 Sensitive animal species adversely affected - 0 Sensitive species habitat destroyed <1 ac Sensitive species habitat altered <1 ac 	<ul style="list-style-type: none"> Federal TES plant species adversely affected - 0 Candidate federally listed TES plant species adversely affected - 0 Sensitive plant species adversely affected - 3 Federally listed TES animal species adversely affected - 0 Candidate federally listed TES animal species adversely affected - 0 Sensitive animal species adversely affected - 0 Sensitive species habitat destroyed <1 ac Sensitive species habitat altered <1 ac 	<ul style="list-style-type: none"> No effect No effect No effect No effect No effect No effect No effect No effect
15. Wetlands	<ul style="list-style-type: none"> Palustrine wetlands lost - 0 ac Palustrine wetlands disturbed or altered - 9 (0.4 ac) Riverine wetlands lost or altered - 2 (0.6 ac) 	<ul style="list-style-type: none"> Palustrine wetlands lost - 0 ac Palustrine wetlands disturbed or altered - 9 (0.4 ac) Riverine wetlands lost or altered - 2 (0.6 ac) 	<ul style="list-style-type: none"> Palustrine wetlands lost - 0 ac Palustrine wetlands disturbed or altered - 9 (0.4 ac) Riverine wetlands lost or altered - 2 (0.6 ac) 	<ul style="list-style-type: none"> No effect No effect No effect
16. Cultural	<ul style="list-style-type: none"> Sites affected - 4 (1 adversely affected, 3 no effect) 	<ul style="list-style-type: none"> Sites affected - 4 (1 adversely affected, 3 no effect) 	<ul style="list-style-type: none"> Sites affected - 4 (1 adversely affected, 3 no effect) 	<ul style="list-style-type: none"> Sites affected - 4 (1 adversely affected, 3 no effect)
17. Facilities ⁽⁵⁾	<ul style="list-style-type: none"> Clearing - 7.2 ac Grading - 3,550 cy Earth fill - 4,050 cy Stone fill (channel) - 60,800 tons Stone fill (general) - 0 tons Retaining walls - 1,200 lf Stone paving - 81,000 sf Asphalt paving - 0 lf Temporary facilities - 201,040 sf Permanent facilities - 0 sf Spoil disposal - 72,100 cy 	<ul style="list-style-type: none"> Clearing - 10.2 ac Grading - 13,926 cy Earth fill - 9,124 cy Stone fill (channel) - 95,900 tons Stone fill (general) - 23,000 tons Retaining walls - 5,680 lf Stone paving - 84,500 sf Asphalt paving - 24,850 lf Temporary facilities - 192,140 sf Permanent facilities - 13,920 sf Spoil disposal - 9,700 cy 	<ul style="list-style-type: none"> Clearing - 12.5 ac Grading - 11,730 cy Earth fill - 8,474 cy Stone fill (channel) - 95,900 tons Stone fill (general) - 53,400 tons Retaining walls - 3,700 lf Stone paving - 83,400 sf Asphalt paving - 71,944 lf Temporary facilities - 192,640 sf Permanent facilities - 16,740 sf Spoil disposal - 0 cy 	<ul style="list-style-type: none"> No effect No effect No effect No effect No effect No effect No effect No effect No effect No effect No effect

**Table S.J.-1
Alternative Comparison Matrix - Continued**

Resource Category	Alternative 1	Alternative 2	Alternative 3 Proposed Action	Alternative 4 No-Action
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- (1) Table S.J.-1 compares the effects of each alternative considered on each resource category prior to mitigation.
- (2) Economic impacts presented in this EIS are limited to the effects of developing, operating, and rehabilitating the Olympic whitewater course within a four county region of influence. This limited area was chosen to disclose the economic impacts at the local level. Economic impacts to other counties and to the State of Tennessee were projected by KPMG Peat Marwick in the "1996 Summer Olympic Games Canoe/Kayak Whitewater Slalom Event Feasibility Analysis."
- (3) Net local fiscal effect is the difference between incremental revenues accruing to local governments due to the project, minus additional expenditures resulting from the project.
- (4) The fraction represents the number of negative effect changes to the Recreation Opportunity Spectrum (ROS) site indicators caused by the action effect/the total number of site indicators inventoried.
- (5) All quantities are taken from the Design Report.

lane section between the venue and U.S. 411 operate under congested conditions (LOS D, E, and F). The accident rate for the section of U.S. 64 near the venue was reported by TDOT as 2.58 accidents per million vehicle miles during the period from January 1, 1987 to November 22, 1988. This is above the statewide average of 1.84 accidents per million vehicle miles for two-lane rural roads and above the critical rate of 2.45.

A Tennessee Department of Transportation (TDOT) study of U.S. Highway 64 through the Ocoee gorge indicates that tractor-trailer trucks must cross the center line to successfully negotiate at least one of several severe curves thereby making it difficult for two trucks to pass on this curve without an accident.

Socio-Economics

The economic analysis presents the effects of developing, operating, and rehabilitating the Olympic whitewater course. To focus the analysis, a Region of Influence (ROI) was established to predict the social and economic effects of holding the Olympic event. This analysis does not consider the social and economic effect to the State as a whole but is limited to the four-county ROI surrounding the proposed venue site.

The direct economic and social effects of the proposed Olympic events and related activities are expected to be most notable in Polk County since the county has limited infrastructure. Direct effects are also anticipated to occur in three adjacent counties: Bradley County, Tennessee; Cherokee County, North Carolina; and to a lesser extent, Fannin County, Georgia.

The resident population of the four-county region was 123,517 persons in 1990, an increase of 8,687 persons over the 1980 population of 114,830, according to the U.S. Department of Commerce, Census Bureau. The most populous county, Bradley County, had a reported population of 67,547 residents in 1980 and 73,712 in 1990. Bradley County experienced the largest population increase and average annual growth rate during the 1980s, with a 9 percent net gain in resident population. Polk County remained the least populous county in the region, with a net increase of 41 residents in the 1980s and a reported population of 13,643 in 1990.

Visitors and seasonal, recreational, or occasional residents are two other population segments which have an effect on the local economy. The Tennessee Department of Tourist Development estimated there were 3.3 million visitors to southeastern Tennessee in 1991, and about 454,100 visited the Ocoee River region. The region with the exception of Polk County is well-promoted as a recreation destination, attracting tourists and persons maintaining dwelling units for

seasonal, recreational, or occasional use. Tourism visitors typically are lodged in accommodations which are available for daily and weekly rental, although a small percentage may stay with family or friends who permanently reside in the area. Visitor accommodations include hotels, motels, campsites, and tourist cabins. There is a lack of lodging and related services in Polk County. While the region is promoted as a high quality destination recreation area, Polk County has not been promoted as a destination recreation area.

Recreational use of the Ocoee River has increased substantially in recent years. TDEC reported that there were 143,917 total users of the Ocoee River in 1988. Total users include paying (commercial) customers with guides and guide trainees of the outfitters, and all other users. By 1992, the number of total users of the river increased an estimated 32 percent to 189,796. The peak month for river use is August, followed by July and then June. Total annual commercial users, including guides and guide trainees of the outfitters, increased from 122,052 reported in 1988 to 167,553 in 1992. This increase is an average of 11,375 commercial users annually.

In summary, over the period 1969-1990, the region has been experiencing an increase in jobs in the manufacturing, retail and wholesale trade, services, and finance/insurance/real estate sectors, as indicated by employment and income data. The most rapid growth has been in the wholesale trade and finance/insurance and real estate sectors. The expansion in these economic sectors has helped to offset job loss in the agricultural sector, which has been declining since the 1960s. As measured by reported earnings, agriculture and mining had declined to the two smallest economic sectors in the region.

Recreation

Recreation opportunities in the CNF are diverse and offer a wide range of experiences including hiking, camping, fishing, hunting, picnicking, canoeing and kayaking, whitewater rafting, and other recreational activities.

Developed and dispersed recreation opportunities were inventoried in the vicinity of the proposed Olympic Venue. The Recreational Opportunity Spectrum, developed by the Forest Service was utilized as a framework for understanding the relationship and interaction of settings and activities. A visitor profile was developed in conjunction with the facilities inventory to provide an overview of baseline conditions.

Developed recreational opportunities in the Ocoee Ranger District include sites at Chilhowee, Lake Ocoee (also known as Parksville Lake) Thunder Rock, Sylco, and Tumbling Creek. Activities

available include access to whitewater rafting at the Ocoee River, swimming, hiking, camping and fishing.

Dispersed recreational opportunities account for most of the land area in the CNF, which includes about 600 miles of hiking trails, several hundred miles of streams, and most of the general forest area. Areas for dispersed recreation can be used for active recreation occurring in underdeveloped areas and for passive recreation.

Two wildernesses are proximate to the Ocoee River and are within the Ocoee Ranger District. The Little Frog Wilderness encompasses 4,800 acres of undeveloped, roadless land. The Little Frog Wilderness is near the upper Ocoee River on the north side of U.S. Highway 64. The Big Frog Wilderness encompasses 8,055 acres of undeveloped, heavily forested, roadless land located approximately 2 miles from the upper Ocoee River site.

There are nine major hiking trails and one ATV trail in the Ocoee Ranger District. The other trails prohibit motorized vehicles. A new hiking trail, the Benton-Mackaye, is proposed for construction.

Surveys of visitors to developed recreational facilities in the CNF reveal characteristics of the visiting populations. The typical visitor to the region is a white male between the age of 25 and 44 years with some college education, earning between \$25,000 and \$49,999 annually. Activities in which the visitors participate include motor boating and fishing, canoeing and kayaking, developed camping, dispersed uses, picnicking, pleasure driving, rafting and swimming, and sunbathing.

Almost 90 percent of the visitors whose primary recreational pursuit is canoeing and kayaking are repeat visitors. About 40 percent of the total visitors for this purpose are in groups, either family or friends. The majority of rafters are also repeat visitors.

Visual Resources

Visual resources in the CNF associated with the proposed 1996 Olympic Venue were analyzed using procedures from the Forest Service's Visual Management System (VMS). The Forest Service applies the VMS to all land management decisions and activities, such as road construction, timber harvesting, recreational facilities and structures.

The project site for the proposed Olympic Venue offers a spectacular natural setting in a beautiful corridor of the CNF along the Ocoee River. The steep rugged topography, forest vegetation, rock outcroppings, and Ocoee River create a naturally beautiful area. Man-made modifications affecting the visual quality of the area surrounding the project site include U.S. Highway 64, TVA's diversion of the Ocoee

River, electric power lines, and the historically significant Old Copper Road.

TVA's diversion of the Ocoee River has resulted in two types of visual features in the area. Physical structures such as the dams, aqueducts, power houses, and supporting facilities affect the viewshed. Almost as important visually is TVA's diversion of water from the river. At minimal flow periods, the lack of water in the channel has a significant effect on the visual resources of the area.

The frame of reference used by the Forest Service's VMS process to distinguish physical features and classify each into character types are landform, rockform, vegetation, and waterform. The landform of the project site is comprised of hilly to mountainous topography with slopes ranging from 1 to 60 percent. Rockform features in the area are distinctive in their visual character and have significant impact on the scenic qualities the region is known for. Therefore the boulders and rock outcrops on the site, especially near the Ocoee River, are considered an outstanding individual feature. Vegetation primarily consists of mixed coniferous and hardwood forest, which is typical of the area. The primary waterform in the viewshed is the Ocoee River, which is the primary drainage system in the area. While the river often has low water levels, it can exhibit unique fast-flow characteristics across rapids in the area of the project site during storm events or release of water by TVA. When the upper river is dry throughout much of the year, the whitewater flow of the water, which is the most unique feature and visual resource of the project area, is absent.

Geology and Soils

The Ocoee River is located in the Blue Ridge Physiographic Province, which is bounded on the west by the Valley and Ridge Province and on the east by the Piedmont Province. The Olympic Venue site lies in the mountain belt, and is underlain by Precambrian rocks of the Great Smoky Group which is a member of the Ocoee Series. These rocks have undergone several episodes of deformation and faulting resulting in a structurally complex setting.

The bedrock of the project area is composed of metasedimentary rocks of the Boyd Gap Formation. The major rock types of this formation are laminated slates or phyllites and metagraywacke. The rocks of the Ocoee Series contain sulfide minerals such as pyrite, pyrrhotite, chalcopyrite, sphalerite, and marcasite. Sulfide minerals occur throughout the unit, although they are most prevalent in the fine-grained slate and phyllite. "Anakeesta" is a generic term used to describe rocks that have the potential to produce acid drainage. The rock units found in the Ocoee

River area may not be correlative to the Anakeesta Formation of Great Smoky Mountains National Park.

Field reconnaissance was conducted at the site in late 1992, and in early 1993. Pyritic materials and existing acid drainage were identified in most of the road cuts along U.S. Highway 64 near the project area. Pyritic materials were also identified along road cuts on the access road to Ocoee No. 3 Dam. These roads are constructed through layers of acid-producing rock.

Lithologic samples were collected from outcrops and from fill material in the project area. The samples were identified as slates, phyllites, and metagraywackes. Many of the samples collected contained visible pyrite crystals. Road fill material was identified east of the "Blue Hole" parking area. The potential for this material to produce acid drainage is high, as the fill material probably came from nearby roadcuts known to contain acid-producing minerals.

The following soil types have been identified within the project area: Cataska Rock Outcrop Complex, Citico Channery Silt Loam, Fletcher Silt Loam, Ranger Channery Silt Loam, Tusquitee Loam, and Quaternary Alluvium. The majority of the soils found within the project area are at least moderately erodible and are susceptible to landslides. The Cataska soil series occupies approximately 85 percent of the project area (along the floodplain of the Ocoee River), and is classified as having severe erosion potential. Acid drainage is a potential concern for all of the soil types present at the site with the possible exception of alluvium.

Hydrology

The baseline conditions inventory of hydrological resources included watershed, channel stability, water availability, and water quality.

Watershed

The proposed competitive channel zone of the Ocoee River is located 2.5 river miles below TVA No. 3 Dam, between river miles 26.2 and 26.8.

The Ocoee River, known as the Toccoa River until it crosses the Georgia-Tennessee state line, originates in the north Georgia mountains. The TVA controls the river and maintains the Blue Ridge Reservoir upstream in Georgia as well as the Ocoee complex of dams and reservoirs. Downstream from the Tennessee state line, the river is impounded to form Ocoee No. 3 Reservoir. Here most of the water is diverted into a tunnel down to the Ocoee No. 3 Powerhouse. Below Ocoee No. 3 Powerhouse is Ocoee No. 2 Dam, where water is diverted through a wooden flume to Ocoee No. 2 Powerhouse. Ocoee No. 1 Dam, located about eight miles below Ocoee No. 2 Powerhouse, confluent with the Hiwassee

River about 12 miles downstream near Benton, Tennessee.

The Ocoee River projects were originally designed as single-purpose projects (hydroelectric power generation) with incidental recreational and flood control benefits. The Ocoee reservoirs are among the smallest in the TVA system, and provide slightly more than 2 percent of the total hydroelectric capacity of the TVA system.

Channel Stability

In the area of the proposed competitive channel, the natural river channel downstream of Ocoee No. 3 Dam is a broad (150-200 feet), rocky channel with a steep left bank with a road (U.S. Highway 64) and a steep bank on the right. The minimum elevation difference between the channel bottom of the natural riverbed and U.S. Highway 64 is approximately 10 feet at river mile 26.13.

The natural channel bottom is formed by exposed metamorphic rock formations. Numerous boulders and ledges are present and contribute to the overall channel hydraulics. The average channel slope in the area of the proposed competitive channel is 53 feet per mile. The natural drop over the length of the proposed course is approximately 25 feet.

Decades of erosion in the Copper Basin have caused extensive sediment deposits in Ocoee No. 3 Reservoir and Lake Ocoee. Ocoee No. 3 Reservoir has lost approximately 80 percent of its original volume, is less than 50 feet deep at the dam, and has an average depth of only 6 feet. Lake Ocoee has lost approximately 24 percent of its original volume, has an average depth of 45 feet, and is approximately 100 feet deep at the dam. At the present rate of filling, Lake Ocoee is estimated to have a remaining useful life of approximately 100 years.

The Ocoee River is subject to extreme flood events. A severe flood, rated in excess of a 500-year frequency flood, occurred on February 16, 1990. During this flood, the Ocoee River was estimated to have risen 17.5 feet in the area of the proposed competitive channel (river mile 26.2 to 26.8).

The site of the proposed competitive channel and the surrounding unincorporated areas of Polk County are recent participants in the National Flood Insurance Program (NFIP), administered by the Federal Emergency Management Agency (FEMA). FEMA maps floodplain elevations on Flood Insurance Rate Maps (FIRMs), which categorize all areas in the community regarding floodplain status for flood frequency (100- and 500-year floods).

Because Polk County is a recent participant in NFIP, a FIRM for the site has not yet been issued by FEMA. The only existing flood map is the Flood

Boundary and Floodway Map (FBFM) issued by the U.S. Department of Housing and Urban Development, Federal Insurance Administration, effective January 19, 1979. This map shows that the Ocoee River, reservoirs, shorelines, and the larger tributaries are classified as Zone A, Special Flood Hazard Areas. It will not be known until the FIRM is issued if these FBFM special flood areas are in the 100-year floodplain, the 500-year floodplain, or a designated floodway.

Water Availability

The Ocoee River system dams are operated for the purpose of meeting power and recreation system demands as economically as possible. Hydroelectric - power generation is used to provide peaking power quickly for those times when daily power demands are the highest. Hydropower generation is also scheduled for high demand times of the week (generally during the 5-day work week) and year (June through August and December through February).

Pool elevations at Ocoee No. 3 Reservoir ordinarily do not vary significantly over the course of the year, except during historic sediment sluicing events. After the sluicing operations were completed, the pool elevation returned to normal.

As Ocoee No. 2 Reservoir is riverine in nature, the dam merely diverts flow to the flume without impounding a large pool. For 106 days per year, from March through October, TVA provides an average of at least 1,200 cfs from Ocoee No. 2 to the riverbed to provide whitewater recreation opportunities. Including 10 maintenance days, TVA releases water through Ocoee No. 2 Dam for a total of 116 days per year.

Pool elevations at Lake Ocoee vary seasonally, from a high maintained from May to October, to a low in January and February. This operation furnishes limited auxiliary flood control benefits.

Water Quality

The State of Tennessee has designated the waters of the Ocoee River and its reservoirs (river miles 0 through 37.9) for the following use classifications: support of fish and aquatic life, recreation, industrial water supply, livestock watering and wildlife, and irrigation. The segment from river miles 0 through 17 is also designated for domestic water supply. A water quality report compiled by the State of Tennessee (1988) listed Lake Ocoee and Ocoee No. 2 Reservoir, and 189 acres of No. 3 Reservoir, as not supporting their designated uses. The remaining 378 acres of Ocoee No. 3 Reservoir were characterized as partially-supporting their designated uses.

Four aspects of water quality were identified as relevant in terms of potential effects of the proposed venue: the amount of sediments suspended in the

water, the capability of the Ocoee River water to assimilate potential acidic discharges, the metals content of the water, and the sediment quality.

Concentrations of suspended solids vary along the Ocoee River. Upstream of the proposed site, suspended solids concentrations ranged from 1 to 148 mg/L with an average value of 14 mg/L. The pH levels of the river are moderately low, with an average value downstream of the site of 6.5. The buffering capacity is expected to be relatively low.

Water quality data was limited for the venue site. There is some indication that water quality near the venue site has improved in terms of metals concentrations. Recent (1993) survey data characterized the waters of the Ocoee River as more suitable for supporting aquatic life. In terms of recreational use of the water, detected concentrations of metals and cyanide met EPA's guidelines for drinking waters and health advisories.

Due to the lack of sediment quality data for the proposed venue location, a field survey was conducted in January 1993. Sediment contamination by metals in samples collected during this survey showed a substantial change compared to previous data. In general, the recently collected samples suggested improved quality in sediments of the upstream reservoir (Ocoee No. 3). However, sediment quality at and below the venue is low. Low sediment quality in the two sampling sites located near the project area was indicated by high concentrations of several metals. Detected levels of copper, lead and zinc exceeded reference values for sediment quality, and in the case of copper, also surpassed the limit of tolerance indicative of potentially limiting conditions for most benthic organisms.

Biological Resources

Surveys were conducted by the ID Team to determine baseline conditions in the vicinity of the proposed Olympic Venue for aquatic resources, wildlife, vegetation, and threatened and endangered species. Additional information was compiled from available resources, agency contacts, and local experts.

Aquatic Resources

Several sites along the main channel of the upper Ocoee River were surveyed for fish and benthic invertebrates. Four tributaries entering the upper Ocoee River were also surveyed and deep pools were investigated.

Three stonerollers and a few macroinvertebrates were collected from the Ocoee River below Ocoee No. 3 Dam. No fish were observed by divers in deep pools within the channel. Viable fish populations were only observed in Rough Creek and Laurel Creek. It was concluded that due to poor water quality, sedi-

ment quality and water diversion practices, the Ocoee River below Dam No. 3 does not presently support viable fish or macroinvertebrate communities.

Wildlife

An evaluation based on management indicator species (MIS) was conducted to determine the immediate and long-term effects of carrying out the proposed Olympic event (see Section IV.C.12). The white-tailed deer, yellow-breasted chat, eastern bluebird, and American kestrel are selected MIS for early successional habitats; the black bear and pileated woodpecker are selected MIS for late successional habitats. Current habitat suitability varies in quality from moderate to low for the MIS designated.

Vegetation

For forest management purposes, the CNF is divided into administrative compartments comprised of individual stands. Each stand is periodically surveyed by trained forestry crews and assigned a forest type and management code based on species composition and dominance, age class, and stocking. Forest type codes, management type codes, and stand condition classes are further discussed in Chapter III. Nine compartments, comprised of from 9 to 50 individual stands each are located in the vicinity of the proposed Olympic Venue. Vegetation characteristics vary considerably according to slope and aspect.

Threatened and Endangered Species

Information concerning threatened, endangered, or sensitive species (TES) in the region was gathered from federal and state agencies, existing reports, additional field surveys, and regional scientists with specialized knowledge of TES species in the Ocoee River ecosystem.

Nine species of TES plants [i.e., those listed either on the Federal Endangered Species List or the State of Tennessee Endangered Species List] are known to occur in the Ocoee River gorge. Of these, Ruth's golden aster is the only species that is currently federally listed as endangered. Two other species, Nevius's stonecrop and Fraser loosestrife, are candidates for federal listing, pending additional research concerning habitat and life history. Six species in the Ocoee River gorge are state listed. These species consist of chalk maple, pink lady slipper or moccasin flower, bush honeysuckle, southern lobelia, Carey saxifrage, and horse sugar or sweet leaf. Southern nodding trillium, a state-listed species, was previously collected from a location near Lake Ocoee in 1980. All of these plant species have been identified as sensitive species by the Forest Service and are protected within the CNF.

Although few species of animals on the USFWS Endangered Species List are known to occur in the

Ocoee River gorge, several species considered sensitive by the Forest Service and TWRA have been reported from the gorge. Several other sensitive species have been reported from surrounding areas (i.e., Polk County), but have never been reported in the Ocoee Gorge. TES wildlife species that may occur in the Ocoee River gorge include the red-cockaded woodpecker, grasshopper sparrow, osprey, bald eagle, green anole, six-lined racerunner, northern pine snake, southern water shrew, star-nosed mole, New England cottontail, Carolina northern flying squirrel, hairy-tailed mole, rafinesque's big-eared bat, least weasel, Tennessee dace, Ocoee covert snail, and the snail darter.

The only species of animals on the USFWS Endangered Species List (1991) known to occur in the Ocoee River gorge are the red-cockaded woodpecker and the bald eagle. Both populations consist of a single individual that occurs almost 10 miles downstream from the proposed Olympic Venue site. The eagle has been observed only during winter and is unlikely to be present in the gorge during the proposed event. Several animal species considered sensitive by the Forest Service have been reported from Polk County but have never been reported in the Ocoee Gorge. The green anole, a state-listed species that is not considered sensitive probably occurs at the site. Aquatic species are not known from the site.

Wetlands

Large wetlands associated with the Ocoee River were identified by examination of the National Wetland Inventory (NWI) map of the area produced by the USFWS. Wetlands in the immediate locale of the proposed project site that did not appear on the NWI map were delineated and mapped during field surveys.

The NWI map indicated the presence of two different types of wetlands in the area surrounding the proposed Olympic Venue site: riverine and palustrine. The Ocoee River channel and most of the larger tributaries of the river appear on the NWI map as riverine wetlands.

Nine small palustrine wetlands that do not appear on the NWI map were located along the Old Copper Road upstream from the proposed project site. Vehicular traffic along the road has resulted in deep rutting in many locations, contributing to creation and/or expansion of these small wetlands. Another forested wetland was located 1.5 miles downstream from the site near Rogers Branch.

Cultural Resources

Cultural resources within, and adjacent to the project site were identified using surveys previously conducted, supplemented with an on-ground field sur-

vey undertaken in early 1993. Prior surveys conducted near the venue site identified the three hydro-electric power plants (Ocoee Powerhouse Nos. 1, 2, and 3) and associated components (flumes, tunnels, and dam). These structures are all listed on the National Register of Historic Places (NRHP). A later survey identified the Old Copper Road as being eligible for listing in the NRHP.

A cultural resources survey of previously unsurveyed areas was conducted as part of the baseline conditions inventory process. The survey was conducted in accordance with guidelines being developed between the Forest Service and the Tennessee State Historic Preservation Officer (SHPO) in a memorandum of agreement (MOA). This survey identified a portion of the Old Copper Road as being within the potential effects area of the Olympic Venue site. The road is significant both for the early engineering features it retains and displays and as an outstanding, preserved example of early transportation in the Southern Appalachians.

Facilities

The majority of utilities would be developed on-site (water and sewerage) or would utilize off-site facilities (solid waste). Existing municipal infrastructure is adequate to accommodate current demands of the system's existing user population. Additional potential user populations might be served by extension of collection/trunk lines. Electricity and telecommunication services would be brought to the venue site.

L. ENVIRONMENTAL CONSEQUENCES

To provide the context in which potential environmental effects may occur, discussions of potential changes to both the built and natural environments are included in this EIS. Effects to each resource category were evaluated in response to the issues identified during the scoping process. These effects may occur as a direct result of construction and operation of the Olympic Venue as described in the Design Report (USDA, 1993), or as an indirect result caused by induced changes within the immediate region. The following is a summary of environmental effects of the alternatives on issues/resource categories identified during the scoping process.

Air Quality

Effects on air quality would occur during both construction and operations associated with development of Alternatives 1, 2 and 3. Combustion emissions and intermittent fugitive dust (particulate matter) emissions could result from vehicles and construction needed for the event. Operational effects could occur from commercial transport vehicles and personal vehicles used for transportation to and from the proposed venue. Air quality effects generated by

Alternatives 1, 2 or 3 would be temporary. Under the No-Action Alternative, air emissions would be the same as baseline conditions.

Traffic and Transportation

Alternatives 1, 2, and 3 would have a similar effect on peak hour bus traffic on U.S. Highway 64, result in a lower LOS, and increase the potential for shuttle bus/tractor trailer conflicts on U.S. Highway 64. Alternative 3 would result in the largest traffic volume on U.S. Highway 64 west of the venue during peak hours. Under the No Action Alternative traffic levels would increase with time above baseline levels.

Socioeconomics

Although the analysis presented in this EIS is constrained to pre-Olympic and Olympic events, there are long-term economic effects that might accrue to Polk County and the State. Use of the Ocoee River is likely to increase as people are drawn to the area because an Olympic event was held here. Even greater economic returns could be realized if the upper Ocoee River is maintained for future competitive whitewater events. Commercial outfitting on the upper Ocoee could bring even larger numbers of people into the area and increase the economic impact to Polk County in particular and the region and state in general. As infrastructure improvements are made in Polk County, tourism could show marked increases. The feasibility analysis conducted by KPMG (1992) and the analysis presented in the EIS disclose some of the anticipated future economic events associated with the holding of the Olympic whitewater event in southeastern Tennessee.

During venue construction Alternative 3 would have the greatest effect on the local economy, adding approximately \$4.4 million in local sales. Alternative 2 would result in an additional \$4.1 million in local sales and Alternative 1 would add \$3.1 million. Increased local employment would also result from implementation of these alternatives. Alternative 3 would add 227 employees, Alternative 2 would result in an employment increase of 215 jobs, while Alternative 1 adds 159 new jobs to the local economy. The No Action Alternative would have no effect on the local economy.

Operation of the venue for pre-Olympic and Olympic events under Alternatives 1, 2 and 3 would result in the same effect to the local economy. Each Alternative would result in a sales increase of \$16.9 million and an additional 145 jobs. The No Action Alternative would not effect the economy.

The cumulative (construction and operations) direct effects of the Alternatives on the local economy would be greatest under Alternative 3 (\$21.3 million

in sales, 372 jobs), and least under Alternative 1 (\$19.9 million in sales, 304 jobs).

According to the economic feasibility analysis conducted by KPMG Peat Marwick (1992), the total estimated pre-Olympic returns are expected to be \$69.8 million in Tennessee. The total direct and induced spending, for organizing and operating the pre-Olympic events alone, in 1993 is expected to total \$9.3 million; in 1994, \$16.6 million; and in 1995, \$25.7 million. KPMG also summarized the direct spending by visitors from 1993 through pre-Olympic events in 1995. KPMG estimates that \$3.4 million will be spent by visitors in 1993; \$5.8 million in 1994; and \$9.0 million in 1995. In 1996, direct and induced spending is expected to total \$13.8 million. These are basic projections and do not include tax benefits.

Recreation

The implementation of Alternatives 1, 2, or 3 would result in the temporary loss of recreation opportunities during construction and venue operation, including swimming at the "Blue Hole", hiking and access to the Old Copper Road, and sightseeing from U.S. Highway 64. Retention of the parking area and improved access to hiking the Old Copper Road would be positive effects associated with Alternative 1. Alternative 2 would result in additional recreation opportunities due to the parking area, improved access to hiking the Old Copper Road, a day use building, the upper bridge, additional trails, and the competitive channel being available for whitewater recreation. Alternative 3 would result in the same additional opportunities as Alternative 2, plus a new lower pedestrian bridge would provide access to the left bank and terraces for seating. The No Action Alternative would have no effect on recreation resources in the vicinity of the site.

Visual Resources

Effects on visual resources resulting from implementation of alternatives were assessed for landform modifications, tree clearing and planting of vegetation; buildings and structures, site development activities, and utilities installation.

Alternative 1 would result in minor modifications to landforms as the competitive channel would be temporary but evidence of the construction would still be visible for some time after Olympic events. There would be limited clearing of trees and all structures would be removed after Olympic events. Some potential exists for scarring of the riverbed during channel removal which could effect the visual resources of the river. Site reconditioning would remove all utilities. Alternative 1 would therefore have the least effect on visual resources.

Under Alternative 2 channel narrowing and bridge abutments would be the principal landform modifications. More vegetation would be required than under Alternative 1 which over time, and if completed in accordance with the guidelines, returns the natural visual character of the site. Retention of the day use building and bridge could have an effect on visual resources. Effects of utilities would be minimal.

Alternative 3 would have effects to visual resources similar to those experienced under Alternative 2. The addition of the lower pedestrian bridge and terracing could effect visual resources. Alternative 3 would have a slightly greater effect on visual resources than Alternative 2. The permanent terraces would cover the non-indigenous limestone rock fill used in the abrupt highway embankment, to create a more natural appearing landform exerting a positive effect on visual resources. The effect of utilities would be minimal. The No-Action Alternative would not affect visual resources along this segment of the Ocoee River.

Geology and Soils

The principal effects on geology and soils would result from construction and reconditioning activities. Acid drainage potential is possible during channel construction under Alternatives 1, 2 and 3 if the bedrock has a high sulfide content. Implementation of any of these alternatives would not effect mineral resources.

Alternative 3 would result in the clearing of the greatest amount of vegetation, and therefore the greatest potential for soil erosion. Alternative 1 would have the least effect on land clearing. Alternative 2 requires the largest quantity of grading, followed by Alternatives 3 and 1 respectively. Amounts of earth and limestone fill would be greatest for Alternative 3, followed by Alternatives 2 and 1, respectively.

Material mobilization immediately following the Olympic events would be greatest under Alternative 1 due to site reconditioning. Alternatives 2 and 3 would require the least materials during mobilization efforts. The No Action Alternative would result in no effects on geology and soils.

Hydrology

The effects of the alternatives on the Ocoee watershed, channel stability, water availability and water quality are discussed below.

Watershed

Temporary modifications to the channel would require minimal grading, and the clearing of approximately 7 acres of land under Alternative 1. There would be no significant change in ground permeabil-

ity. Alternatives 2 and 3 would have approximately the same effect on the watershed. Permanent modifications to the channel under Alternatives 2 and 3 would result in clearing of not more than 10-13 acres of land, and slightly decreased ground permeability. The No Action Alternative would have no effect on the watershed.

Channel Stability

Sediment quality at the venue site and downstream of the venue would be unchanged under all alternatives. Under Alternatives 1, 2 and 3 the water surface elevation would increase 1.5 feet. Alternatives 1, 2, and 3 would result in some potential erosion and scouring due to anticipated increases in channel velocity. Sediment transport during construction under Alternatives 2 and 3 would be less than for Alternative 1. There would be some increase in sediment deposits in Lake Ocoee resulting from Alternative 2 or 3. The No Action Alternative would not affect channel stability.

Water Availability

Alternatives 1, 2 and 3 would result in a 6.7 percent decrease in water availability for power generation. In addition, under Alternative 1, limited and temporary modifications to existing flows and operations between Ocoee No. 3 and No. 2 Dams would result. There would be a minimum loss of dependable power. Water availability would not be affected by the No Action Alternative.

Water Quality

Alternatives 1, 2 and 3 are not expected to result in significant increases in water acidity or a pH modification. There would also be no significant increase in dissolved metals under these alternatives. During construction Alternatives 2 and 3 would result in the greatest increase in suspended solids (85 percent and 74 percent above baseline respectively). Alternative 1 would result in an increase of 28 percent. During site reconditioning, Alternative 1 would temporarily increase suspended solids by 399 percent, while Alternative 2 would have a 54 percent temporary increase; and Alternative 3 would not increase suspended solids because this alternative requires less site reconditioning.

Biological Resources

The following is a discussion of the effects of the alternatives on aquatic resources, wildlife, vegetation, and threatened and endangered species.

Aquatic Resources

Alternatives 1, 2, or 3 would have a minimal, temporary effect on biota downstream from the site. Under Alternatives 2 and 3, new fill material to cover existing metal-laden sediments is likely to provide

more adequate substrate for future development of benthic communities in the constructed channel. This would be a temporary occurrence under Alternative 1. The No Action Alternative would not modify the existing channel, and therefore not affect aquatic resources.

Wildlife

The MIS analyses show that effects of the proposed project vary between early and late successional species. Generally, species associated primarily with mature forest systems will not benefit from Alternatives 1, 2, or 3 due to the delay in succession and the time to maturation. The MIS representing this group was the pileated woodpecker. Other species likely to have similar effects include other woodpeckers, the gray and fox squirrels, and a variety of songbirds such as the Carolina chickadee, blue jay, wood thrush, and Kentucky warbler. Effects to early successional species varies by alternative and among individual species. The amount of early successional habitat that would be created varies among Alternatives 1, 2, or 3. This group is represented by the eastern bluebird, American kestrel, and yellow-breasted chat. There are some differences in habitat use among these three species and effects of the Olympic project vary. Species likely to benefit from Alternatives 1, 2, and 3 include the eastern cottontail, cotton rat, common yellowthroat, and indigo bunting. Some species such as the white-tailed deer use a variety of habitats and would generally benefit from Alternatives 1, 2, or 3 because regeneration areas are a relatively small component of the forest community in this region of the CNF, and these areas would be increased. The same applies to the black bear. There is, however, some habitat quality loss (primarily that related to mast production) for these species with the Alternatives 1, 2 and 3. Species likely to respond similarly to the white-tailed deer include the eastern wild turkey and ruffed grouse. Both may be indirectly affected by increased visitation expected under Alternatives 2 and 3.

Vegetation

Some habitat destruction and clearing of vegetation are unavoidable during construction phases of the proposed project. Plants that would be destroyed belong to species that are common elsewhere in the vicinity, as well as elsewhere in their range. The vegetational communities on the site are common communities that are only present because the site was severely disturbed during the past century. Although clearing will retard ecological succession in the immediate vicinity of the proposed project site, this effect should be minimal because the area to be cleared would not exceed 13 acres, and similar habitats are abundant nearby.

Threatened and Endangered Species

Effects on TES species are similar for Alternatives 1, 2 and 3. Threats to plant species include potential destruction of population(s) and/or habitat modification due primarily to construction and increased visitation. Indirect effects would occur as a result of increased visitation under Alternatives 2 and 3. Implementation of the No Action Alternative would result in no effect to TES species.

Ruth's golden aster, the red-cockaded woodpecker, and the bald eagle occur far enough downstream from the proposed project site that direct effects from the proposed activity should be negligible. Small populations of pink lady slipper, southern lobelia, and horse sugar are potentially threatened by the proposed venue. A few individuals of horse sugar are likely to be destroyed during construction activities unless purposefully avoided, and populations of pink lady slipper and southern lobelia are likely to be trampled by visitors that walk upstream from the site of the proposed event. The other sensitive plant species, as well as other population(s) of these three, occur sufficiently downstream from the proposed project site that direct effects of the event should be negligible.

Wetlands

Alternatives 1, 2 and 3 would have similar effects on wetlands. These effects would be directly related to construction activities and only affect one site within the channel, a few small tributaries, and small emergent wetlands proximate to the Old Copper Road.

Primary wetlands threatened by the proposed activity consist of a series of small, seepage wetlands that occur upstream from the proposed project site along the Old Copper Road. These wetlands occur far enough upstream that effects associated with construction activity would not occur. However, these wetlands are likely to be affected by foot traffic associated with increased visitation to the site primarily under Alternatives 2 and 3. The wetlands are not likely to be destroyed from this activity, but modification of hydrological regimes and plant communities are likely. Approximately one acre would be affected,

and less than one acre would be filled or hydrologically modified.

Cultural Resources

Alternatives 1, 2, and 3, and the No Action Alternative would effect four identified cultural resources. A segment of the Old Copper Road eligible for inclusion on the National Register of Historic Places (NRHP) would be adversely affected by all alternatives. Alternative 1 would directly effect a segment of the Old Copper Road during venue construction and site reconditioning. Alternatives 2 and 3 would exert direct effects of both a positive and negative nature on the Old Copper Road during venue construction; and indirect effects due to increased use of the site. The No Action Alternative would indirectly adversely effect the Old Copper Road as a result of current, continued traffic.

Facilities

Activities related to site engineering improvements include those associated with venue construction, operation and for Alternative 1, reconditioning. These activities include: clearing, excavating, grading, filling and paving.

Alternatives 1, 2 and 3 would have a similar effect on venue site water supply, wastewater and power and would consist of installation of access roads, and construction of easements and rights-of-way for utilities.

Alternative 1 would require 60,800 tons of stone fill to construct the competitive channel. Alternatives 2 and 3 would require 95,900 tons of stone fill. Alternative 3 has an additional 53,400 tons of rock to create spectator seating. Clearing and grading would have the least effect under Alternative 1 and the greatest effect under Alternative 3.

Immediately following the Olympic event, site reconditioning would occur. Reconditioning would have the greatest effect with Alternative 1, resulting in disposal of 72,000 cu. yd of spoil. Alternative 2 would require disposal of 9,700 cu. yd. of spoil. No spoil disposal would result from Alternative 3. The No-Action Alternative would have no effect on facilities engineering activities.

CHAPTER I

PURPOSE AND NEED

I. PURPOSE AND NEED

This chapter identifies the following: the proposed action, the project area, the purpose and need for the proposed action, and the decision required. It also describes the environmental impact statement (EIS) process, scoping for the proposed action, and lists the significant issues to be addressed in the analysis.

This EIS examines the potential for effects on the environment as a result of constructing and holding the 1996 Olympic whitewater venue on the Ocoee River in Polk County, Tennessee. This document has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, Council on Environmental Quality (CEQ) and Forest Service regulations, and is responsive to the Cherokee National Forest Land and Resource Management Plan (FLRMP), (USDA, 1986b) and management area objectives. Appendix E presents a glossary of terms, acronyms, and abbreviations used in this document.

A. PROPOSED ACTION

The Forest Service proposes, on behalf of the State of Tennessee, to design and construct facilities needed to operate a canoe and kayak whitewater slalom course on the Ocoee River, Polk County, Tennessee. The course would be the site of the Whitewater Slalom Venue of the 1996 Summer Olympic Games being hosted by the City of Atlanta, Georgia. In addition to the physical development of the course within the channel of the Ocoee River, proposed improvements consist of program facilities required by the ACOG to hold the event. Required program elements include access to both sides of the river, visitor, administrative and support facilities, spectator viewing areas, athlete rest, and comfort areas, and other facilities (Appendix G-1 contains the program elements).

In order to meet the requirements set by ACOG, the Forest Service developed a design concept for the event in consultation with the U.S. Canoe and Kayak Team, the official entrants to the Olympic event. This conceptual design is described in a report entitled *Conceptual Designs - 1996 Olympic Whitewater Canoe and Kayak Venue on the Ocoee River, Tennessee*, dated January 27, 1993, referred to herein as the Design Report. With the concurrence of the State, the Forest Service developed a proposed action responsive to the International Olympic Committee program requirements that would serve as a monument to the Olympic event in Tennessee and preserve the legacy of the Olympics for not only

the people of Tennessee and the Ocoee Region but for the people of the United States.

Development of the Olympic Venue would occur along a 2,500-foot length of the Ocoee River beginning in the vicinity of the area known locally as the "Blue Hole." The competitive channel would begin immediately below the "Blue Hole." The river would also serve to divide the venue into two discrete areas, facing downstream: the left bank for athletes, officials, and media; and the right bank for spectators and VIPs. Facilities for judges and television crews would be provided along both right and left banks of the course.

In order to enhance the flow rate of the water release levels available for competition and training, the existing channel would be narrowed approximately 50 percent with rock fill consisting of massive quarry stone. The quarry stone would be faced with river boulders salvaged from the fill areas, and then covered with soil and vegetation material to emulate the natural stream banks found elsewhere along the Ocoee River. These same fill areas along the left bank and right bank would be used for siting many of the venue facilities. The competitive channel itself would occur within the narrowed streambed, and would not involve any excavation of that streambed.

At the lower end of the venue, a heavy-load capacity temporary bridge would be erected for construction and management access, to be removed upon completion of the site rehabilitation following the 1996 events, and replaced with a pedestrian bridge. At the upper end of the venue, a light-load permanent vehicular bridge would be built. A mid-course river crossing would be provided with a temporary "breeches buoy."

An athlete day-use area would be developed on the left bank at the upper end of the venue. It would incorporate temporary team tents, temporary dining and lounging shelters, temporary shower and medical facilities, and permanent restrooms.

Temporary shelters and tents would be arrayed along the left bank for official management and media functions. A temporary broadcast compound would be located at the lower terminus of the venue on the left bank, screened from public view behind a stand of existing pines. Media observers would be provided temporary bleachers for viewing the course from the left bank. A small permanent structure housing timing and

scoring equipment would be located near the course finish on the left bank.

The eastbound lanes of the four-lane section of U.S. Highway 64 would be closed to traffic, and used for temporary facility placement and pedestrian circulation at the venue site. Crash barriers would be erected in the highway median for visitor safety, and these barriers would be topped with a continuous fabric banner to provide sound baffling.

Spectators, athletes, media personnel, event volunteers, and VIPs would arrive at the site via shuttle buses or limousine service. On-site parking would be provided only for key officials. Spectators would disembark at the west entry portal, where they would pass through ticketing control into a vending, concession, and exhibit concourse consisting of temporary structures erected on the closed eastbound lanes of U.S. Highway 64. All others would use the administrative entry portal at the east end of the venue.

A service building of approximately 16,000 square feet would be located adjacent to the east entry portal on a ridge line at least 25 feet above the river elevation. This building would serve as an administrative building for the Atlanta Committee for the Olympic Games (ACOG) personnel as well as national and international sport federation officials during the year that the venue is under ACOG management. It would also include locker rooms, training and medical facilities for athletes who would be on-site during that same period. Timing and scoring equipment would be operated out of this building. A number of meeting and interview rooms would be provided. Storage areas for boats and the gate system would be provided. Expansive spaces for hosting the Olympic family also would be provided. A caretaker apartment is included in the building for security purposes.

VIP and Olympic family viewing would occur both from the service building as well as from a series of naturalistic earth and rock terraces to be developed between the building and right bank of the river near the course start. Temporary cabanas and restroom facilities would be provided on these terraces, with a total capacity of 1,500 people. A picnic area would be developed along the ridge immediately south of the service building.

Ticketed spectators would be provided with a mix of seating options. The primary seating for spectators would be provided by a system of earth and rock terraces and mounds developed between the course finish line and the aforementioned VIP

terracing system on the right bank. Terracing would provide seating for 7,000 spectators. Additional elevated seating would be provided by temporary bleachers erected above the terraces. Bleachers would provide seating for 8,000 spectators. A network of pathways would afford free circulation between the start and finish lines for spectators to move with the "action," while maintaining sight lines for spectators seated on terraces or bleachers.

Temporary restroom facilities would be provided during event periods (July 1995 and July 1996) utilizing trailer-unit buildings equipped with mini-flush toilets connected to a permanent holding tank buried on-site, and pumped as necessary. Sanitary waste management treatment for permanent buildings would be provided by a septic tank/leach field system located on a broad ridge south of the venue site. Electrical power would be brought to the site along the existing Tennessee Valley Authority (TVA) transmission corridor adjacent to the site. Communications would be brought to the site via fiber-optic cable buried in the highway right-of-way.

Following completion of scheduled events in 1996, all temporary facilities would be removed, the pedestrian footbridge at the lower end of the course would be installed, and the athlete day-use area and broadcast compound would be converted to picnic facilities.

A reasonably foreseeable development scenario (RFDS) is included in Chapter IV. Because of uncertainties concerning availability of water to sustain long-term whitewater operations, locations of launching and take-out facilities, and permitting procedures and administration of the site over the long-term, no decision has been made regarding post-Olympic use of the site or facilities. While the RFDS described in Chapter IV discusses potential uses and effects of future use, no decision will be made on future use pending further environmental analyses. Future use of the site and facilities is considered outside the scope of this analysis. While the proposed action and one alternative provide for permanent improvements, this does not imply future use of the site has been determined.

B. PURPOSE AND NEED FOR ACTION

In 1989, the U.S. Canoe and Kayak Team provided ACOG with a proposal to use the Ocoee River as the site of the 1996 Olympic whitewater canoe and kayak competition. Other rivers in the southeastern United States, including the Chattahoochee and Chattooga Rivers in Georgia and the Nantahala and French Broad Rivers in

North Carolina, were considered for the event by the U.S. Canoe and Kayak Team but were rejected as potential sites for several reasons, including being further than 2 hours driving time from Atlanta, inability to regulate flows, and being designated Wild and Scenic River. Among the reasons contributing to the U.S. Canoe and Kayak Team's selection of the upper Ocoee River were less traffic congestion, ability to locate most of the facilities above the floodplain, and less effect on existing commercial and recreational whitewater use.

The Atlanta Olympics Organizing Committee made the recommendation to the International Olympic Committee that the Ocoee River be selected as the site for the 1996 Whitewater Venue. The Atlanta Committee's proposal was accepted by the International Committee, which stated that if whitewater slalom events were included in the 1996 program, they would be held on the Ocoee River. In December 1992, the International Committee formally elected to include whitewater slalom course events in the 1996 Olympic Games on the Ocoee River.

The State of Tennessee was invited to sponsor the event. In 1991, prior to the International Olympic Committee decision to include whitewater events in the 1996 Games, the State conducted a feasibility study to determine the potential for successfully hosting Olympic events on the Ocoee River.

The purpose of this EIS is to analyze and disclose the environmental effects of developing and operating a whitewater slalom course and associated facilities, as proposed by the State of Tennessee and Forest Service, on the Ocoee River. For this analysis, the course would operate for pre-Olympic practice and competition in 1995 and 1996 in addition to the Olympic competition scheduled for July 26-28, 1996.

C. PROJECT AREA AND SCOPE OF THE PROPOSED ACTION

The lower Ocoee River is presently being used for whitewater canoeing/kayaking and rafting. Several competitive events are held yearly on the lower Ocoee. However, the lower reach was found to be unsuitable for Olympic competition.

The proposed course is located within the Cherokee National Forest (CNF) on the Ocoee Ranger District, Polk County, Tennessee about 28 miles east of Cleveland, Tennessee (Figure I.C.-1). U.S. Highway 64 provides access to the area. The whitewater course is proposed for a 400 to

600-meter-long section of the Ocoee River between TVA Dam Number (No.) 3 and Dam No. 2. The proposed whitewater course would be located about 1.1 river miles above Power House No. 3, immediately below the area known as the "Blue Hole". This section of the Ocoee River has very low flow because of water diversion for power generation at TVA-operated Power House No. 3. Water present within the main channel is attributed mainly to small inflows from tributary drainages.

Construction of the course and associated facilities would begin in 1994 and conclude with post-Olympic removal and rehabilitation. Most facilities would be in place for pre-Olympic competitive events in the summer (July 29-30) of 1995. The Olympic competition is scheduled to occur over a 3-day period from July 26 to July 28, 1996.

D. COOPERATING AGENCIES

Upon review of the State's proposal, the Cherokee National Forest Supervisor invited TVA and the State of Tennessee to participate as cooperating agencies in the environmental analysis of the development proposal.

As the proposed site is within and on National Forest System land, the Forest Service is the lead agency as defined by the CEQ. The Forest Supervisor is responsible for supervising the preparation of the EIS.

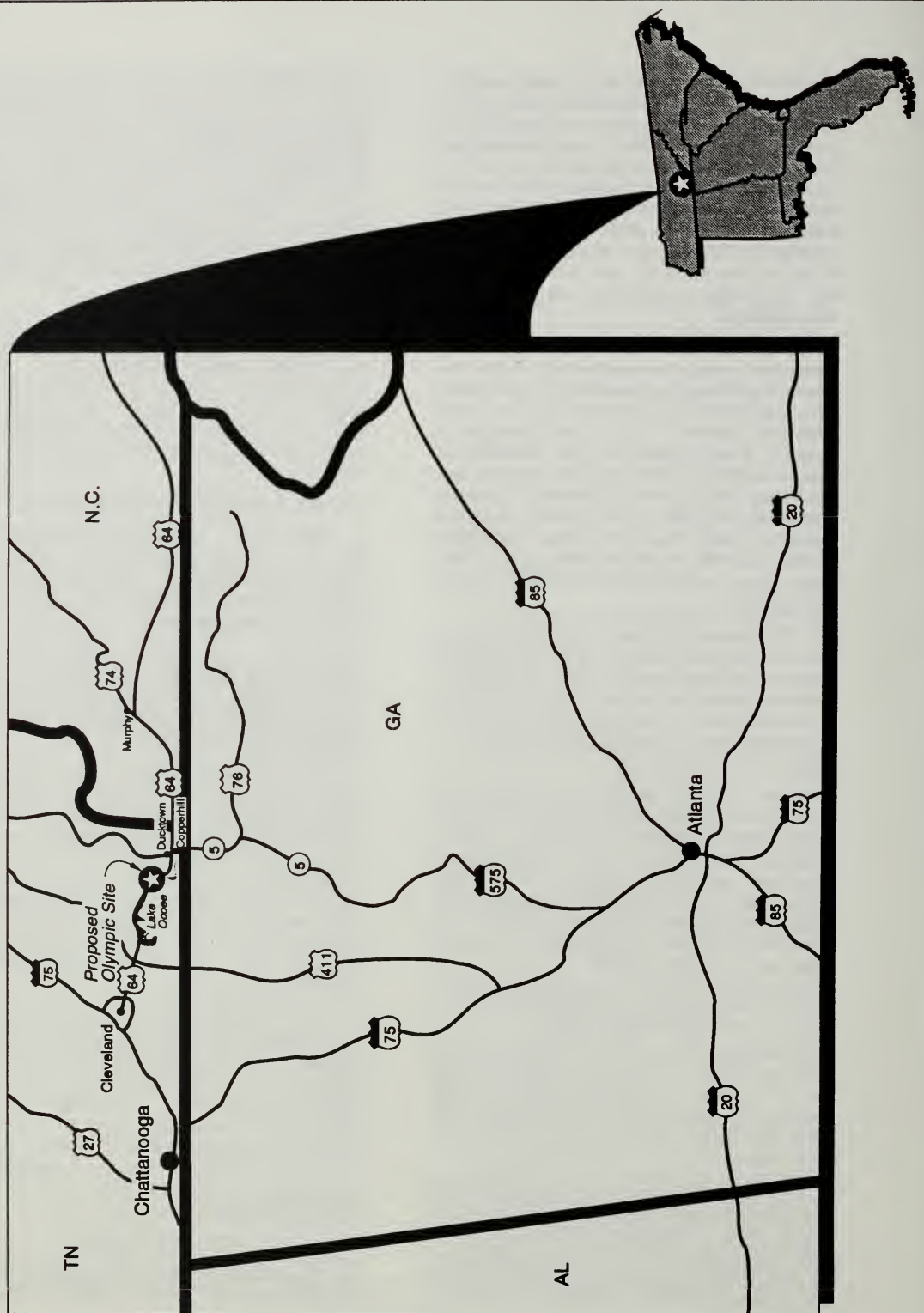
TVA was invited to participate as a cooperating agency because it owns lands and operates hydroelectric facilities on the river. Water releases for the proposed event would have to be coordinated with, and approved by TVA. Also, TVA has the special expertise in stream channel hydraulics that is needed to help model channel characteristics that will be used to design the Olympic competitive channel. TVA assigned personnel to the Forest Service interdisciplinary team (ID Team).

The State of Tennessee is cooperating in the environmental analysis because of its interest in bringing the Olympics to Tennessee both as an economic stimulus, and because the State possesses needed expertise in transportation, social, and economic analysis. The State also must issue many of the permits needed to hold the event. The State's early and continued involvement assures that all needed permitting would be accomplished in a timely manner.

E. DECISION NEEDED

The following decisions would be made by the Forest Service, Tennessee Valley Authority,

Figure I, C-1
1996 Proposed Olympic Venue



and the State of Tennessee following issuance of the final EIS (FEIS).

E.1 Forest Service Decisions

The decisions to be made by the Forest Service following the environmental analysis and issuance of the FEIS are whether or not the Forest Service would authorize the development and operation, through the issuance of a special use permit, of a whitewater slalom course and associated facilities for the 1996 Summer Olympic Games and associated pre-Olympic events on the Ocoee River. The Forest Service would also determine under what conditions such use would be authorized. These decisions would be limited to use of the course and facilities for pre-Olympic and Olympic events. Any use of the facility after 1996 would be evaluated through future environmental analyses.

If an alternative other than that of no action is selected, the Forest Service also would make a decision to amend the Forest Land and Resource Management Plan (FLRMP), changing the current Management Area designations to Management Area 1, Developed Recreation Site. Presently, the proposed Olympic site is managed under the standards and guidelines for the following four management areas:

- Management Area 1 includes developed sites located throughout the Forest.
- Management Area 5 includes lands and waters with high visual sensitivity and a high degree of public interest;
- Management Area 11 includes protected archaeological sites;
- Management Area 17 includes general Forest lands available for resource management;
- Management Area 18 includes aquatic and riparian areas, floodplains, and wetlands.

Only the immediate area of the Olympic site, encompassing the facilities to be developed for the event, would be considered as a developed recreation site.

E.2 Tennessee Valley Authority Decision

As a cooperating Federal agency in the preparation of this EIS, TVA will adopt the FEIS and jointly sign a Record of Decision with the Forest Service and the State of Tennessee. Based upon the analysis and disclosure of effects contained in the FEIS, TVA would make a decision whether or not to release water from Ocoee Dam No. 3 into the main Ocoee River channel for

competitive events and scheduled training periods instead of diverting water for hydroelectric power production at Powerhouse No. 3.

E.3 State of Tennessee Decision

The State of Tennessee will adopt the FEIS and, based upon the analysis and disclosure of effects contained in the FEIS, jointly sign a Record of Decision with the Forest Service and TVA. The State would decide whether or not to issue the required permits needed for construction and operation of the Olympic Venue.

F. RELATIONSHIP TO THE CHEROKEE NATIONAL FOREST LAND AND RESOURCE MANAGEMENT PLAN

The 1996 Olympic Whitewater Slalom venue EIS is tiered to the FEIS for the FLRMP. The FLRMP provides overall management direction by establishing multiple-use goals and objectives, standards, and management guidelines for Forest management. The Record of Decision implementing the FLRMP was signed April 1, 1986.

The proposed action falls within Forest Management Areas (MAs) 5, 11, 17, and 18 established by the FLRMP. The goals and objectives of management for those areas are located on page IV-97 through IV-101, IV-137 through IV-142, IV-177 through IV-182, and IV-183 through IV-193, respectively, in the CNF FLRMP. In addition, overall goals and objectives for the CNF are located on pages IV-6 through IV-50 in the FLRMP. Further refinement of goals and objectives have been implemented through the approval of amendments to the FLRMP.

MA 5 comprises lands and waters with high visual sensitivity and a high degree of public interest. The FLRMP emphasizes noncommodity uses of MA 5 lands. These lands are adjacent to, and visible from, such high-use areas as highways, trails, rivers, and lakes.

Recreation use is managed for semi-primitive nonmotorized, semi-primitive motorized, and roaded natural recreational opportunities. The FLRMP objective is to provide dispersed recreation opportunities within suitable road corridors and near developed sites. Overnight use is not permitted between roads and water courses if the distance between them is less than 0.25 mile. The FLRMP establishes that the areas involved in the proposal are to be managed to maintain the existing "roaded natural" setting and recreational opportunities, and where possible, to create conditions for a "semi-primitive motorized" setting (FLRMP pp. IV-97, IV-98).

Special uses, utilities, and other improvements are permitted, provided the visual quality objective (VQO) of "retention" is met. All special uses and access roads are designed to meet this VQO (FLRMP pp. IV-97, IV-100). Vegetative manipulation, such as timber harvests, are allowed to enhance the recreational opportunities, scenic values and wildlife habitat (FLRMP pp. IV-99).

Management standards and guidelines for MA 5 which are applicable to the proposed venue are as follows:

- Meet the VQO of retention for the area.
- Manage those rivers listed in the "National Rivers Inventory" (i.e., the Ocoee River) so as to maintain them to no less than their present conditions. The Ocoee River was studied in 1991 and found to be ineligible for classification under the National Wild and Scenic River System. The Ocoee River is still within MA5 however, but it can be maintained in less than its present condition because it is ineligible (FLRMP, IV-98).
- Accomplish changes in habitat diversity through visual quality management.
- Control mineral exploration and extraction, within legal limits, so that it does not conflict with the provision of high scenic and recreational values.
- Allow special uses, provided VQOs can be met.
- Allow roads for special uses, mineral development, or as access to management activities in other MAs.

MA 11 consists of sites that have archaeological or historic significance. These areas are given special protection in compliance with the National Historic Preservation Act and the Archaeological Resource Protection Act.

The general direction provided by the FLRMP for MA 11 which is relevant to the proposed development includes the following actions:

- Inventory known sites.
- Prepare and implement cultural resource management plans for areas identified as needing immediate protection.
- Nominate eligible sites to the National Register of Historic Places.
- Meet the VQO of retention for the area.

- Limit construction to that necessary to enhance or protect cultural values and to provide for public safety.
- Manage for a "roaded natural" recreation opportunity.
- Limit timber removal to that necessary to enhance or protect cultural values and to provide for public safety.
- Prohibit road, trail, and other facility construction involving ground disturbance in this area.

MA 17 comprises lands in the "general forest area." These lands are available for varying degrees of resource management and production. The lands in MA 17 occur throughout the CNF. A small portion of the proposed action lies within MA 17. The goal for the MA is to manage timber on suitable lands in an economically efficient manner and in such a way as to provide a high degree of vegetative diversity and wildlife habitat.

The general direction adopted to attain this goal which is relevant to the proposed venue development includes:

- Manage recreation resources to provide "roaded natural" recreational opportunities.
- Manage for wildlife species which rely on young stands of timber (i.e., manage for optimum browse and cover production, and emphasize timber management which favors deer, grouse, fox, and associated game and nongame species).

MA 18 comprises lands that are floodplains, wetlands, and riparian environments. All such lands within the proposed action which are not designated as MA 5, 11, or 17 are managed according to the MA 18 standards and guidelines. The management goal for MA 18 is to protect water quality by reducing sediment, maintaining stream temperatures, increasing stream channel stability, and providing food sources. Lands managed for thermal insulation of perennial streams are considered unsuitable for timber production.

Management direction for MA 18 includes the following:

- Allow development of recreation sites only if adverse effects on the water resource can be mitigated.
- Plan roads and trails to discourage overuse of riparian areas. Locate roads away from riparian areas.

- Ensure that all management practices conserve soil and water resources, and do not allow significant or permanent impairment of riparian zone productivity.

Amendment 2 to the FLRMP reflects the Tennessee Wilderness Act of 1986. This placed the Little Frog Wilderness Study Area into the National Wilderness System. The Little Frog Wilderness is adjacent to the proposed Olympic Venue.

Amendment 14 to the FLRMP determined that the Ocoee River was not eligible to be a component of the National Wild and Scenic River System.

The proposed action would not comply with the FLRMP under existing MA definitions. The FLRMP must be amended if the responsible officials decide to implement the proposal. The analysis in this EIS identifies the necessary changes to the FLRMP in order for the proposal to comply with the plan. A change to MA1 would be necessary. MA1 includes developed sites as the area is unsuitable for timber production. Within MA1 development typically ranges from essentially natural environments with minimal facilities to a high degree of development.

G. NEPA PROCESS

NEPA requires that the Forest Service analyze and disclose the effects on the environment for all proposed actions. In this case, the Forest Service is analyzing the environmental effects of the proposed action and reasonable alternatives to the proposed action. The purpose of the environmental analysis is to determine the potential environmental effects, beneficial and adverse, of implementing the proposed action and alternatives to the proposed action. The no-action alternative, which is a continuation of current management, is analyzed to gauge the effects associated with development alternatives.

The EIS process is used to display effects associated with implementation of a proposed activity. The EIS also presents mitigation measures that reduce or eliminate effects associated with implementing any of the alternatives under consideration. The EIS is not a decision document, but rather a document that discloses effects of implementing various alternative courses of action and provides the decision-maker with information upon which an informed and rational decision can be based.

The information contained in the EIS is used by the Forest Supervisor in making a decision on implementing a proposed activity. The

Supervisor may decide the negative environmental effects associated with any of the development alternatives are too great for the forest resources to sustain without irreparable damage, and may select the no-action alternative. On the other hand, the Supervisor may determine the proposed activity poses little threat to forest resources or that mitigation can reduce adverse effects to an acceptable level, and may select a development alternative.

The NEPA, Forest Service, and CEQ provide guidance on the types of actions for which an EIS must be prepared. Once it has been determined that an EIS must be prepared, the proponent must publish a Notice of Intent (NOI) to prepare an EIS. This formal announcement signifies the beginning of the scoping period, during which the major environmental issues to be addressed in the EIS are identified. A Draft EIS (DEIS) is prepared, which includes the following:

- A statement of the purpose of and need for the action;
- A description of the proposed action and alternatives, including the no-action alternative;
- A description of the environment that would be affected by the proposed action and alternatives; and
- A description of the potential environmental consequences of all the alternatives.

The DEIS is filed with the U.S. Environmental Protection Agency (EPA), and is circulated to the interested public and government agencies for a period of at least 45 days for review and comment. During this period, a public meeting may be held so that the proponent can summarize the findings of the analysis and receive input from affected agencies and the public. At the end of the review period, all substantive comments received must be addressed. An FEIS is produced that contains responses to comments as well as other changes to the document, if necessary.

The Forest Supervisor's decision and rationale for the decision is disclosed in a Record of Decision. The Record of Decision is prepared after the FEIS is prepared. In this document, the Supervisor states the decision reached on which alternative or combination of alternatives may be implemented and the rationale for the decision. In making the decision, the Supervisor considers such items as environmental effects, laws and regulations, public input, and forest resource concerns, especially those related to threatened and

endangered species. The Record of Decision is based upon the analysis and disclosure of effects contained in the FEIS and project file.

The FEIS and Record of Decision are filed with EPA and distributed in the same manner as the DEIS. A notice of the availability of the Record of Decision will be published in the legal section of the *Knoxville News-Sentinel*, *Johnson City Press*, *Chattanooga Times*, *Cleveland Daily Banner*, and *Polk County News*. Once the Record of Decision is published, the administrative appeals procedures (36 CFR 217) apply to the review of the Forest Service decision. A period of 45 days is provided for public review of the decision and supporting documentation. Any appeal of the decision must meet the requirements of 36 CFR 217 and be filed with the Regional Forester, Southern Region, within 45 days of the day after the legal advertisement. Specific administrative review procedures will be stated in the Record of Decision.

Subsequent sections of Chapter I describe how the Forest Service has complied with NEPA requirements for public involvement in the decision-making process.

H. SCOPING SUMMARY

On December 9, 1991, the State of Tennessee hosted an informal meeting to discuss the Olympic proposal and to seek input on potential issues and concerns with the proposed project. This meeting helped focus the State's proposal for submission to the Forest Service. Upon receiving the State's proposal, the Forest Service began the scoping process.

The intent of the scoping process is to encourage public involvement in the identification of issues relevant to the proposed action. The lead agency (i.e., the Forest Service) is required to publish an NOI in the *Federal Register* as soon as practicable after a decision is made to prepare an EIS (40 CFR 1501.7). The NOI must precede the formal scoping process. The NOI for this EIS was published in the *Federal Register* on May 29, 1992. This date was the beginning of the formal scoping period.

On October 11, 1992, public notice of a scoping meeting to be held on October 26, 1992, was published in newspapers in the cities of Asheville, North Carolina, and Chattanooga, Johnson City, and Knoxville, Tennessee. In addition local news releases were published, and approximately 1,000 letters of invitation were mailed requesting public input on the EIS process, and announcing the date and location of the scoping meeting.

The scoping meeting was held from 5 p.m. to 9 p.m. on October 26, 1992, at Benton Elementary School in Benton, Tennessee. Attendance at the scoping meeting included ID Team personnel; representatives of Federal, State, and local agencies; organizations; and individuals having an interest in the project. Approximately 45 people attended the meeting. Each person in attendance wishing to voice an opinion or identify an issue was provided with a comment sheet and encouraged to respond prior to leaving the meeting, or to mail comments prior to the end of the scoping period.

I. SUMMARY OF SCOPING ISSUES

Numerous comments were received as result of the October 26, 1992 scoping meeting. Comments received as result of the informal public involvement meeting held by the State of Tennessee on December 9, 1991, and comments received as result of publication of the NOI were also considered in the issues identification process.

Issues [40 CFR 1501.7(a)(2)] and concerns raised during the public involvement and scoping process considered in this EIS are summarized below.

Air Quality

- What are the effects on air quality within the Little Frog Wilderness?

Traffic and Transportation

- What are the effects of the proposed action on U.S. Highway 64 local vehicular travel and public safety?
- What are the effects of parking facilities and potential methods of public transport such as shuttle buses on regional thoroughfares and public safety?

Socioeconomics

- What are the short-term and long-term effects on the local and regional demographics and economies?
- What are the effects on TVA in terms of potential power generation reduction and related revenue changes?

Recreation

- What are the effects on present outfitters, guides and river users?
- What are the effects on the "Blue Hole" and local recreational facilities and opportunities?

- What are the long-term effects of maintaining a whitewater course on active and passive recreation use?
- What are the effects on the adjacent Little Frog Wilderness and the wilderness experience?

Visual Resources

- What are the effects of the proposed action on the visual resources of the study area?

Geology

- What are the effects of acidic geological formations in the project area?
- What are the effects of the proposed action on mineral rights and sand and gravel deposits in the area?

Hydrology

- What are the effects on availability of water for power generation?
- What are short-term and long-term effects of the proposed action on water quality and stream channel stability?

Biological Resources

- What are the short-term and long-term effects on fish and wildlife habitats, threatened and endangered species, and wetland resources?

Cultural Resources

- What are the effects of the proposed action on cultural resources?

Facilities

- What are the on-site, short-term and long-term effects on sewage and solid waste collection, treatment, and disposal, and what are the effects on local infrastructure?
- What are the short-term and long-term effects of facilities in the Ocoee River floodplain?

J. ISSUES ELIMINATED FROM FURTHER CONSIDERATION

During scoping, some issues were raised that were evaluated and determined to be out of the scope of the EIS. These issues and the reasons for elimination are in Table I.J.-1.

K. ORGANIZATION OF THIS EIS

This EIS is organized into several chapters and appendices. Chapter II summarizes the alternatives development process and describes in de-

tail each alternative addressed in this EIS. Chapter II also reviews one other alternative considered but eliminated from further evaluation. Chapter III describes the environment that would be affected by the alternatives (by resource category) under baseline conditions. This provides a basis for analyzing effects associated with each alternative. Chapter IV identifies environmental consequences associated with each alternative.

In addition, the following appendices are included in support of this EIS:

- Appendix A - List of Preparers.
- Appendix B - List of Agencies, Organizations, and Persons Provided with Copies of the EIS.
- Appendix C - References Used in Preparing the EIS.
- Appendix D - An Index to the EIS.
- Appendix E - A Glossary of Terms, Acronyms and Abbreviations, used in the EIS.
- Appendix F - The Notice of Intent to Prepare the EIS.
- Appendix G - Pertinent Technical Data Relating to the EIS.
- Appendix H - Permitting Requirements.
- Appendix I - Biological Evaluation/Biological Assessment

L. RELEVANT FEDERAL, STATE AND LOCAL STATUTES, REGULATIONS AND GUIDELINES

The relationship of the proposed action to environmental permitting requirements (Federal, State, and local statutes, regulations, and guidelines with which the Forest Service, cooperating agencies, and ACOG might have to comply) are summarized in Appendix H.

Table I.J.1
Issues Eliminated

Issue	Reason for Elimination
<ul style="list-style-type: none"> • Unfairness of FS issuing a limited number of permits to operate outfitting companies on the Ocoee 	<ul style="list-style-type: none"> • TVA, and not the FS, issues rafting permits. This FS policy of issuing permits to rafting companies on the Ocoee will be summarized under the recreation resource category of the EIS.
<ul style="list-style-type: none"> • FS paying its fair share of property taxes to Polk County 	<ul style="list-style-type: none"> • The FS as a Federal Agency is not subject to local property taxes within Polk County, but does return a portion of all fees collected to the county. This issue is not relevant to the proposed action.
<ul style="list-style-type: none"> • Effects of the project on the Southern Appalachians as a whole ecosystem 	<ul style="list-style-type: none"> • Effects of the project will be evaluated for a cumulative impact area based on the alternatives to be analyzed. Portions of the Southern Appalachians are outside the area affected by the proposed action and are therefore outside the scope of the proposed action.
<ul style="list-style-type: none"> • Consideration of the no-action alternative or an alternative that would minimize the impact on ecosystems and remove all facilities after the events in 1996 	<ul style="list-style-type: none"> • This consideration of the no-action alternative will be evaluated in the EIS in compliance with NEPA (1502.14(d)). The types of facilities will be discussed.
<ul style="list-style-type: none"> • Elimination of logging in the Cherokee National Forest 	<ul style="list-style-type: none"> • This issue is outside the scope of the proposed action. Timber harvesting is discussed in the <u>Land and Resource Management Plan, Cherokee National Forest</u> available from the Cleveland FS office.
<ul style="list-style-type: none"> • Impact of electricity upon agriculture 	<ul style="list-style-type: none"> • This issue is outside the scope of the proposed action.
<ul style="list-style-type: none"> • Interpretation of the Old Parks Brothers Mill, farming, the flume line, Caney Creek Village, Old Copper Road, and mining industry 	<ul style="list-style-type: none"> • This issue is outside the scope of the proposed action. Interpretation of historic resources can be undertaken at any time. Impacts on the Copper Road will be assessed in the EIS since the road will be impacted if the proposed action is authorized.
<ul style="list-style-type: none"> • Effects of proposed action in floodplains in relation to Polk County's participation in the National Flood Insurance Program 	<ul style="list-style-type: none"> • The FS had no jurisdiction to require Polk County's participation in the voluntary National Flood Insurance Program.

CHAPTER II

ALTERNATIVES

II. ALTERNATIVES

This chapter describes the alternatives development process, describes the features of each alternative considered, and identifies one alternative considered but eliminated from the EIS process. A summary table is included depicting the relationship between the alternatives and the significant issues identified in Chapter I.

A. ALTERNATIVES DEVELOPMENT PROCESS

Three issue-driven alternatives were developed to respond to the State of Tennessee's request of the Forest Service to hold the Olympic white-water events on the Ocoee River. These alternatives are consistent with the Olympic Venue program issued by ACOG. The alternatives development process was based upon a rigorous evaluation of comments received throughout the scoping process. Each of the alternatives considered in depth the potentially significant issues raised during scoping, and were designed to minimize adverse effects on potentially affected resource categories. In addition, a fourth alternative, that of no action, was also evaluated per 40 CFR 1502.14 of NEPA. The no-action alternative assumes a continuation of baseline conditions and serves as a basis for evaluating facility emplacement. All alternatives were evaluated as part of the impact assessment process mandated by NEPA.

The ID Team was responsible for preparation of the *Scoping Report* (USDA, 1992) identifying issues of environmental significance relating to the proposed action, and for providing criteria and guidelines to the design contractor for conceptual design of the alternatives. Primary considerations in the alternatives development process included the following:

- Responsiveness to scoping issues (40 CFR 1502.14), and
- Consideration of a range of temporary and permanent facilities.

Based upon perceived environmental issues derived from the scoping process, and adherence to the above considerations, facilities development criteria were formulated to guide the design contractor in developing conceptual alternatives. Using these criteria, the alternatives were prepared to address the issues developed during the scoping process. The alternatives are presented and discussed in the *Design Report* (USDA, 1993). The range of alternatives provides the means to respond to the scoping issues, and provides a basis for choice by decision-makers and the public.

B. DESCRIPTION OF ALTERNATIVES

Three alternatives were developed in response to issues raised during the scoping process. The alternatives development process was based on addressing substantive issues, and therefore the alternatives reflect a less environmentally harmful means of achieving the project purpose and need, as identified in Chapter I. This section includes a detailed description of each individual alternative under consideration, as summarized from the Design Report.

B.1 Features Common To Alternatives 1, 2, and 3

Each of the three alternatives contain common features which may directly or indirectly influence the degree of environmental effect. The ACOG program requirements, transportation system and the design of the competitive channel are the two features common to all three alternatives. In order to preclude excessive document length, and to avoid redundancies in the environmental assessment process, these commonalities are discussed in this section.

B.1.a Transportation System

In each alternative, a shuttle system would be utilized to transport venue participants, facilitators, and spectators from parking areas to the event site. Remote parking areas would be located west of the site in the Cleveland area and east of the site in the Copper Basin area. On-site parking would be provided to accommodate Olympic officials only. This analysis does not identify potential parking areas on private lands.

The project site is immediately adjacent to a four-lane divided segment of U.S. Highway 64. This proximity would provide excellent vehicular access to the site and would allow space for venue functions through closure of the eastbound lanes. The westbound lanes would remain open to two-way traffic. A physical barrier would be used to separate the vehicular highway traffic lanes from the designated pedestrian zone.

The segment of the closed highway from Power House No. 3 to the venue would serve as a queuing and drop-off zone for the shuttle buses. From the highway crossover at the venue's west entry portal, the closed section would function as a pedestrian concourse. The main spectator entry point in each alternative would be located at the western end of the pedestrian concourse. This concourse would access all spectator facilities. Athletes, officials, and VIPs would enter the venue area through the east entry portal near the area proposed for a day use building (described in Alternatives 2 and 3).

B.1.b Competitive Channel

The location of the competitive channel within the river bed would be essentially identical for all three alternatives. Construction methods and materials would vary by alternative. Alternatives 2 and 3 differ primarily in the extent of fill material proposed. The existing 150-200 foot channel would be constricted approximately 50 percent with rock fill. Construction of the channel would not involve any excavation of the streambed but some large boulders would be stockpiled on-site to face the fill used to narrow the channel. The final design of the competitive channel would be determined upon completion and testing of a scaled physical model constructed by TVA. This model is located at the TVA facilities below Dam No. 1.

Design features of the competitive channel include the following:

- The competitive channel would follow the preferred route of the water observed in the Ocoee River's natural deep channel.
- To decrease the reliance on manmade features to create whitewater, the competitive channel would be located within natural constrictions in the river, and natural rock outcroppings would be used as anchoring points for the channel walls.
- Where no deep channel is apparent, the competitive channel would be located so that it would connect one zone of deep channel or natural constriction with the next.
- Naturally occurring mid-stream features such as large outcroppings, ledges, and boulders would be incorporated into the course design as much as possible to decrease the reliance on manmade obstacles.
- Multiple routes through large drops would be added to increase variety. Rapids that consistently favor either right-handed or left-handed competitors would be avoided.
- Fill material would be to the minimum depth required to contain the competitive design flow.

B.2 Alternative 1

This alternative was developed in response to issues voiced during the scoping process relative to returning the site to pre-Olympic conditions after the event. Comments received subsequent to the scoping meeting voiced concern about the effect of permanent facilities on the project area.

In Alternative 1, all ACOG facilities and artificial elements of the competitive channel would be removed after the event. The site would be returned to near-baseline conditions. The existing parking facilities on the right bank would be the

only facility slated to remain following the 1996 Olympic events. A depiction of Alternative 1 is provided in Figure II.B.2-1.

A variety of channel construction options, were considered for Alternative 1, and all but one were rejected when measured against the stated goals and objectives of the project. The goals and objectives were to maintain a natural appearance, to construct low-slope sidewalls, and to provide a vandal-resistant course. The rejected temporary construction options included bladders, water bays, and a concrete cribwall, which did not meet the vandal-resistant or low-slope wall criteria. The composite fill option was selected.

The architectural elements for this alternative would consist of prefabricated and site-assembled components that would be erected for the venue, then removed following conclusion of the Olympic events. The shelters, platforms, and tents would accommodate three primary groups of venue users, as follows:

Venue Participants

Athletes
Coaches
Judges
ACOG Representatives
International Canoe Federation (ICF)
and other Officials

Venue Facilitators

Broadcast
Media
Safety and Security
Sanitation
Maintenance
Service
Vendors

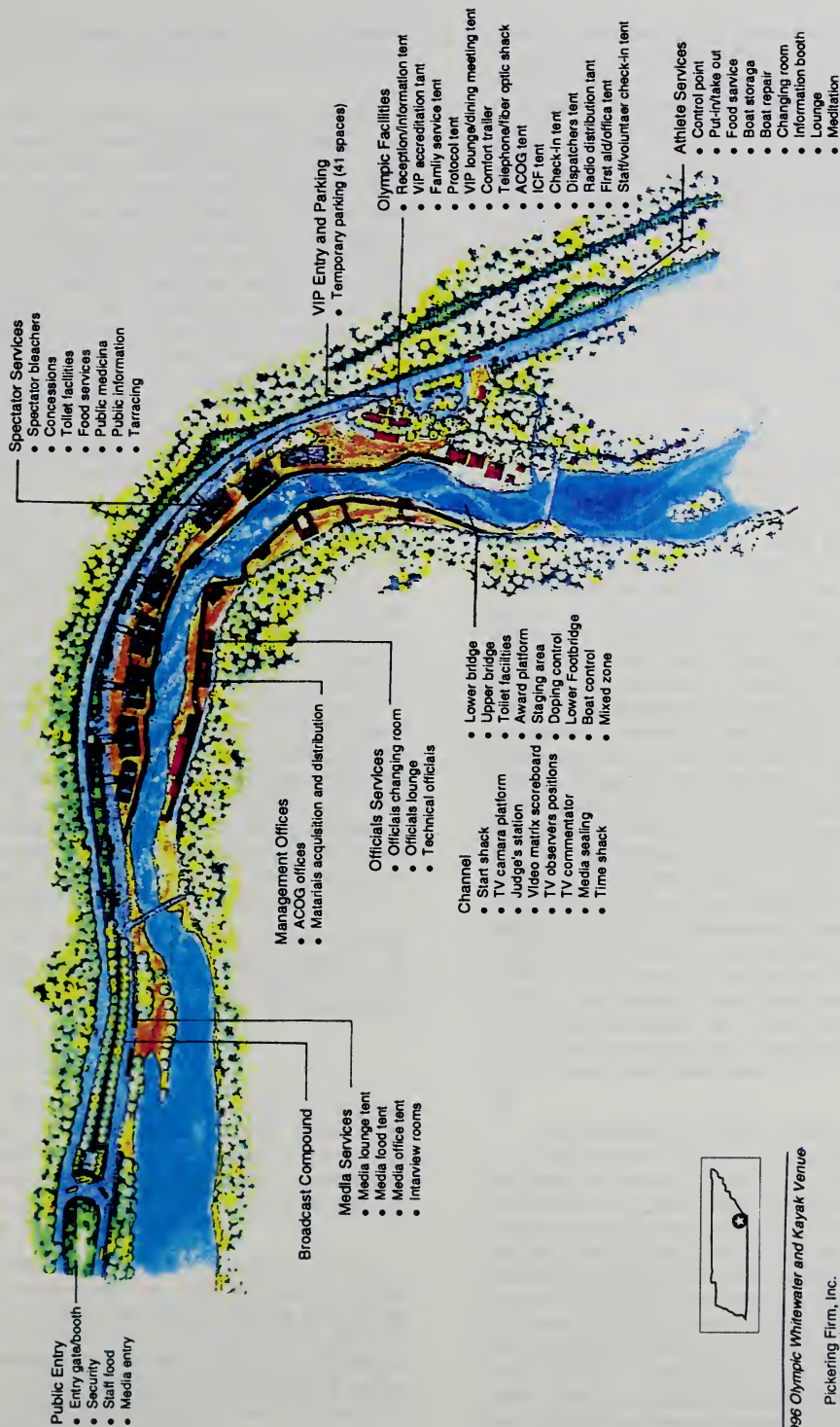
Venue Spectators

Public
VIPs
Family Members
Special Guests

Temporary structures consisting primarily of fabric or tent-like shelters would serve to protect, contain, and screen certain functions that would be required only for the Olympic events. On the right bank, these temporary structures would be festive in appearance and would contrast with the natural surrounding and settings in the spectator areas.

The left bank ACOG programmed facilities would be supported on a temporary scaffolded boardwalk. A roadway, adjacent to existing trees, would be constructed of rock fill to support vehicular traffic. Temporary structures on the left bank would blend with the natural setting and be carefully placed to minimize modifications to existing land forms. While the design and theme of these structures would be dictated by ACOG, the

Figure II. B. 2-1
Concept Design Alternative One



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location and arrangement would be a coordinated effort in order to maximize their function and efficiency.

These temporary shelters would consist of enclosures for venue officials, a start shack, a finish/timing shack, media platforms, judges platforms, athlete accommodations, vendors enclosures, ticket and security check points, screening of comfort stations, and VIP areas. A temporary bridge would be placed just above the "Blue Hole" to provide service personnel, officials, and athletes access to the left bank. This temporary upper bridge would accommodate the 100 year flood, provide head clearance for paddlers and be of a simple design. A temporary, lower bridge would be located below the venue, and would be primarily for utility purposes to provide a haul road for left bank construction and to provide circulation between left and right banks.

On the right bank, ACOG programmed facilities such as grandstands would be constructed directly on the rock levee constructed over the right side of the river channel. It is anticipated that the rock levee would not be water tight, and there would be standing water under the grandstands and boardwalk. The spectator seating is also identified as a series of temporary bleachers fabricated on-site using steel angle components on temporary concrete foundations. These stands would be located over the filled riverbed, adjacent to the competitive channel. Wooden walkways from the bleachers to the original river bank would be constructed over the filled riverbed to allow ease of spectator movement to the closed portion of U.S. Highway 64 where concessions and comfort stations would be located.

The day use area for VIPs, Olympic family, officials, and other special guests would be located in a partially cleared area adjacent to U.S. Highway 64, just below the officials parking area, above the river channel.

B.3 Alternative 2

Alternative 2 also was developed in response to the scoping issues and ACOG program requirements. This alternative seeks to provide the minimum permanent modifications necessary to create post-Olympic use of the site for whitewater training and competitive events.

Alternative 2 is responsive to ACOG program requirements and would provide a combination of facilities that would celebrate the holding of an Olympic event on the Ocoee River. Some of the structures would remain after the Olympics. The remaining facilities would provide a unique set of options for post-Olympic use. Alternative 2 is depicted in Figure II.B.3-1.

Although the routing of the competitive channel within the river bed for Alternative 2

would be the same as for Alternative 1, construction methods and extent of proposed fill material would be different. In Alternative 2, coarse limestone quarry rock would fill the dimensions of the channel, and rounded river rock would be used as facing along the competitive channel. Under Alternative 2, this fill would be the minimum necessary to contain the channel and support the on-grade installation of proposed facilities adjacent to the course.

The architectural elements for Alternative 2 would consist of a combination of temporary and permanent structures. These shelters, platforms, and buildings accommodate the same three primary venue user groups as described for Alternative 1.

The temporary structures, consisting primarily of fabric or tent like shelters, would serve to protect, contain, and screen certain functions that would be required only for the Olympic events. These temporary structures would be festive in appearance and would contrast with the natural surroundings and settings. While the design and theme of these temporary structures would be dictated by ACOG, the location and arrangement would be a coordinated effort in order to maximize the function and efficiency of their placement. These temporary shelters would consist of enclosures for venue officials, a start shack, a finish/timing shack, media platforms, judges platforms, athlete accommodations, vendor enclosures, ticket and security check points, screening of comfort stations, and some VIP seating areas. The spectator seating would consist of a series of temporary bleachers seating 15,000 spectators, fabricated on-site using steel angle components on temporary concrete foundations. These bleachers would be located on terraces over the existing riverbed on fill material adjacent to the newly formed river channel. Under Alternative 2, spectator circulation along the course is minimized. Circulation is confined to the spectator concourse on the closed eastbound lanes of U.S. Highway 64.

The permanent facilities would support and serve the particular needs of the Olympic event, and would be retained afterwards to serve ongoing National Forest needs. These permanent facilities or structures would include an upper bridge to the left bank, utilities that could be accessed for future whitewater activities, the small parking area adjacent to U.S. Highway 64 where the existing pull-off occurs, and a day use building to be located on the knoll just above Old Copper Road and the "Blue Hole." Certain site features such as landscaping, Old Copper Road improvements, and natural buffer/barriers separating U.S. Highway 64 from the river, would remain in place to enhance the existing environment. Permanent manmade structures to remain after the Olympic event

Figure II. B. 3-1
Concept Design Alternative Two



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would include the upper bridge, day use building, and the course.

The Upper Pedestrian Bridge would be located above the "Blue Hole." It would span the area from the Old Copper Road on the right bank to the athletes' area on the left bank, using the existing island as a location for intermediate structural support. The foundation or bridge abutments would be built at the height needed for bridge clearance above 1990 flood levels and faced with natural stone. The spans could be constructed of low maintenance, natural appearing materials to provide a weathered look with little or no maintenance. The trusses supporting the spans would be similar in appearance to vehicular and personnel bridges commonly seen spanning creeks and valleys constructed throughout the region during the last half century. The rails of the bridge would be similar in design to the trusses. The bridge would be designed for H-10 light vehicular loading although it would be closed to all but occasional service vehicles. The lower bridge at the downstream limit of the venue would be the same as described for Alternative 1.

The day use building would be located within a tree thicket barely visible from the parking area and U.S. Highway 64. An existing knoll which is almost level with the parking area would provide access along a sloping walkway. As currently envisioned, this walkway would lead to the main entrance of the facility that is the top level of the day use building. The structure would be built of primarily wood and stone, and the top level would be open with vaulted ceilings and glass looking out over the Ocoee River gorge. From one area of the building, spectators would be able to look out over a creek 20 feet below which passes through a laurel thicket as it makes its way to the river. This level would also provide views up river to the "Blue Hole" and to the mountain beyond. To the right of the main entrance would be an observation deck overlooking the whitewater course and the Ocoee River gorge as it makes its way around a bend paralleling the mountain-side. Balconies would afford visitors vistas in all directions. The main floor of the building would serve as a meeting and social area. At the lower level, toilet facilities and event organizing offices would be located. Other support functions for athletes and venue activities would take place in this area. The lower level would empty onto a patio, just above Old Copper Road, looking out over the course and the "Blue Hole." From the patio via steps and ramps, accessibility to the river's edge would be provided. The design of the day use building would take into consideration the need to convert spaces for future National Forest uses, after the Olympics. Some of the future uses which have been discussed include a regional information center, an interpretive site, a rest and

refreshment station for river users, or a national whitewater training center.

B.4 Alternative 3 (Proposed Action)

This alternative is also responsive to issues raised during the scoping process. Alternative 3 contains additional facilities of a permanent nature, but the majority of features associated with this alternative would be of a temporary nature.

Alternative 3 provides for maximum post-Olympic use of the site within strict naturalistic design constraints. Many of the ACOG programmed facilities would remain after the event for utilization by the Forest Service. The routing and design of the competitive channel is the same as described for Alternative 2. Alternative 3 is illustrated in Figure II.B.4-1.

The architectural elements for this alternative consist of a combination of temporary and permanent structures. These shelters, platforms, and buildings will accommodate the same three primary groups of Olympic Venue users described for Alternative 1.

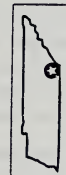
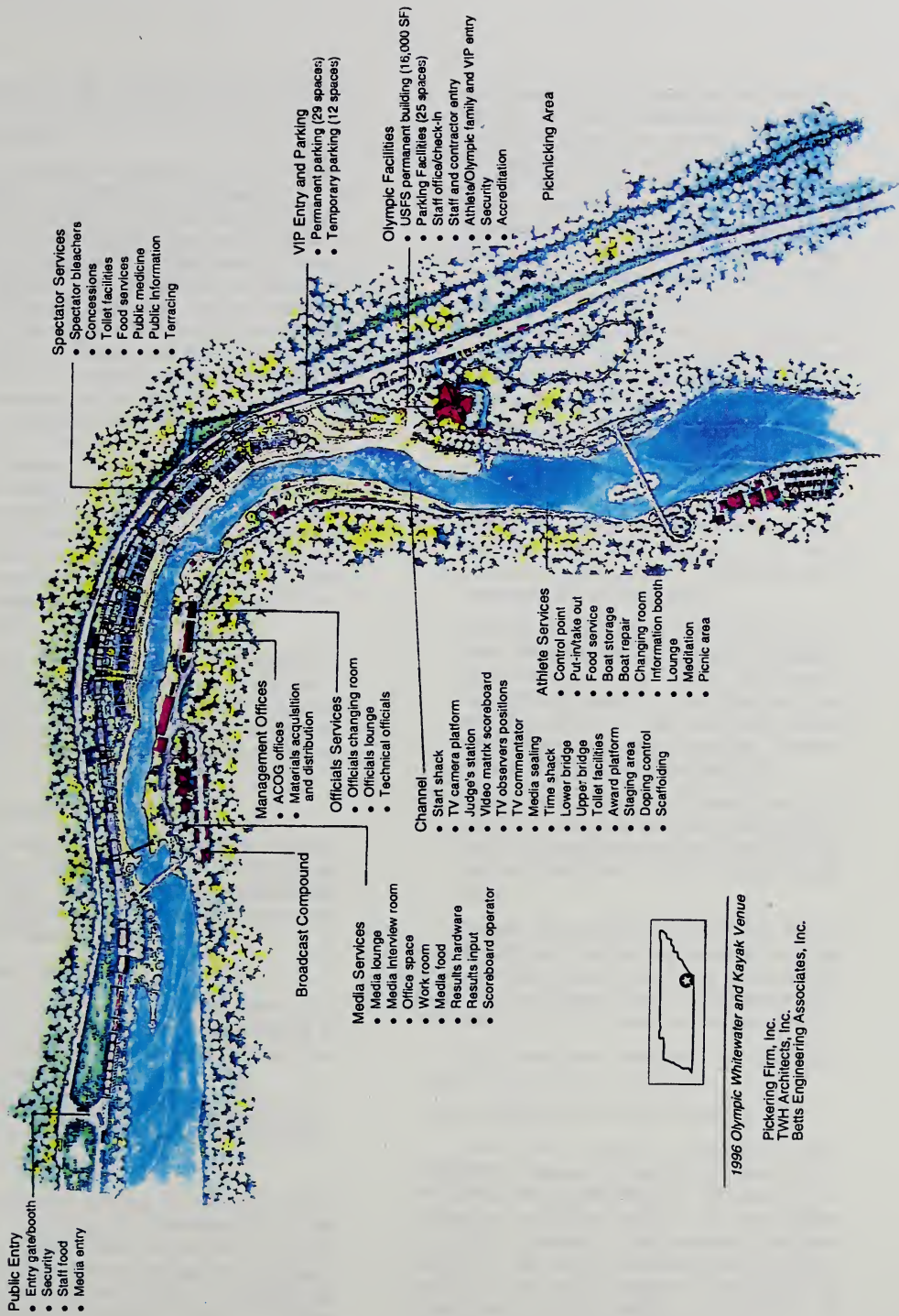
Temporary structures, consisting primarily of fabric or tent like shelters, would serve to protect, contain, and screen certain functions that would be required only for the Olympic events. These temporary structures and shelters would be the same as those discussed under Alternative 2. Spectator seating would be temporary and constructed as detailed under Alternative 2. Permanent terracing would be constructed adjacent to the competitive channel on the right bank and would provide additional spectator seating at the venue. These terraces would be located on a fill area over the existing riverbed adjacent to the competitive river channel.

Permanent facilities would support and serve the particular needs of the Olympic event and would be retained after the Olympics to serve the on-going needs of National Forest users. These permanent facilities and structures would include upper and lower bridges to the left bank, utilities that could be accessed for future whitewater activities, a small parking area adjacent to U.S. Highway 64 where the existing pull off occurs, and an expanded day use building located on the knoll just above Old Copper Road and the "Blue Hole." Certain site features such as landscaping and part of the terraces used for spectator seating could become overflow parking areas to facilitate any future whitewater competitive events. Natural buffer/barriers separating U.S. Highway 64 from the river would remain. Three permanent structures would remain after the event: a lower pedestrian bridge, upper bridge, and day use building.

A lower pedestrian bridge would be erected after the event to allow permanent access to the left bank. This bridge would facilitate access to

Figure II. B. 4-1

Concept Design Alternative Three: Proposed Action



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the left bank near the finish area and provide an alternative to traveling the Old Copper Road to the upper bridge.

The upper bridge would be located above the "Blue Hole" as described in Alternative 2. It would span the area from the Old Copper Road on the right bank to the athletes' area on the left bank using the existing island as placement for intermediate support. The foundations or abutments for both the upper and lower bridges would be faced with natural stone and built to provide the height needed for bridge clearance in event of a 500-year flood. The spans could be constructed of low maintenance, natural appearing materials to provide a weathered look requiring little or no maintenance. The trusses supporting the spans would be similar in appearance to vehicular and personnel bridges seen spanning over creeks and valleys throughout the region during the last half century. The rails of the bridges would be similar in design to the trusses. The surface or platform of the bridges could be heavy timber or concrete on steel, depending on budget constraints and projected uses.

The day use building would be located and designed generally as described in Alternative 2. However, in Alternative 3 this facility would be larger in size to accommodate additional uses including a caretaker quarters for full-time site security.

B.5 Alternative 4: No-Action

The No-Action Alternative assumes that the Olympic event would not be held on the Ocoee River. Under this scenario, no development within or adjacent to the river would occur, and baseline conditions would prevail.

B.6 Alternatives Summary

A comparison of the facilities proposed for each of the alternatives under consideration is provided in Table II.B.6-1, as summarized from the Design Report.

C. ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

C.1 Lower Ocoee Site

An alternative location on the lower Ocoee River was considered for development of the whitewater venue. This alternative was eliminated from detailed study because the development of the site was determined to be technically and administratively infeasible for the following reasons:

- The State of Tennessee, interested in the economic potential of hosting the Olympic event, commissioned a feasibility study in 1991. It was determined that the lower Ocoee River gorge could not be utilized for

an Olympic event because the site could not satisfy all ACOG requirements for facility design and security of athletes. In addition, holding the Olympic event within the present rafting area would present unacceptable public safety risk factors and would interrupt commercial and noncommercial use of the river and U.S. Highway 64 for up to 3 years, resulting in adverse effects on the economy and on recreation resources.

- ACOG, working with the U.S. Canoe and Kayak Team, established whitewater venue requirements that must be implemented to hold an Olympic event (Appendix G-1). The required facilities (approximately 6 acres) necessary for control, operation, service, and comfort could not be accommodated on the lower Ocoee.
- Within the lower gorge, all feasible construction sites are limited by steep sideslopes, and the site is within the base floodplain of the Ocoee River.
- Building of the Olympic facilities will require large equipment including bulldozers, excavators, cranes, and other earth-moving and hauling equipment, and therefore, construction activities in the lower gorge would also create safety and congestion problems on U.S. Highway 64 for several years.
- Ruth's golden aster, a Federally-protected species, is found in the lower Ocoee River area. Increased water releases and visitors to the area could have adverse effects on this plant.

Because the lower Ocoee River site did not meet the Olympic program requirements, and due to the concerns listed above, the lower Ocoee River site was dropped from consideration as a potential site for the Olympic whitewater venue.

Other rivers were considered but eliminated from further study (pp. I-2 and I-3).

D. COMPARISON OF ALTERNATIVES

Table II.D.-1 presents a comparison of the alternatives evaluated in this EIS to issues identified during the scoping process. This table is organized to identify potential environmental effects by resource category. The resource categories correlate to the issues identified during the scoping process as listed in Chapter I of this EIS. The significance of these effects is discussed in Chapter IV, Environmental Consequences.

E. MITIGATION REQUIREMENTS

The ID Team developed project-specific mitigation measures for all alternatives studied in detail in addition to those mitigation measures contained in the FLRMP. These measures include

**Table II.B.6-1
Alternatives Comparison - Facilities**

	ALT 1		ALT 2		ALT 3		NO ACTION	
FACILITY	RB	LB	RB	LB	RB	LB	RB	LB
Broadcast Compound	T	N	N	T	N	T	N	N
ACOG/Event Management	N	T	N	T	P	T	N	N
Doping Control	N	T	N	T	N	T	N	N
Boat Control	N	T	N	T	N	T	N	N
TV Media Observer	T	T	T	T	T	T	N	N
Awards Stand/Flags	N	T	N	T	N	P	N	N
Timing/Scoring	N	T	P	T	P	P	N	N
Media Food	T	N	N	T	N	T	N	N
Photo Processing	T	N	N	T	N	T	N	N
Interview Room	T	N	N	T	N	T	N	N
Workroom	T	N	N	T	P	T	N	N
Results hardware	N	T	P	T	P	T	N	N
Results Input	N	T	P	T	P	T	N	N
Scoreboard(s)	T	T	T	T	T	T	N	N
Scoreboard Operator	N	T	N	T	P	T	N	N
Media Lounge	T	N	N	T	N	T	N	N
Media Control	T	N	T	T	T	T	N	N
Mixed Zone	N	T	N	T	N	T	N	N
Athlete Lounge	T	N	N	T	N	T	N	N
Athlete Tents/Meditation	T	N	N	T	N	T	N	N
Athlete Changing	T	N	N	T	P	T	N	N
Athlete Sports Medicine	T	N	N	T	P	T	N	N
Athlete Food	T	N	N	T	N	T	N	N
Boat Repair/Storage	T	N	N	T	P	T	N	N
Public Gate/Booth	T	N	T	N	T	N	N	N
Security Facility	T	N	T	N	P	N	N	N
Staff Food	T	N	T	N	P	N	N	N
Spectator Seating	T	N	T	N	P/T	N	N	N
Concessions/Vendors	T	N	T	N	T	N	N	N

Table II.B.6-1 (cont'd)
Alternatives Comparison - Facilities

	ALT 1		ALT 2		ALT 3		NO ACTION	
FACILITY	RB	LB	RB	LB	RB	LB	RB	LB
Terracing	N	N	P	N	P	N	N	N
Public Information	T	N	T	N	P/T	N	N	N
Medical/First Aid	T	N	T	T	P	T	N	N
Parking	P	N	P	N	P	N	N	N
Service Building	N	N	P	N	P	N	N	N
Picnicking	N	N	N	N	P	P	N	N
VIP Entry	T	N	T	N	T	N	N	N
VIP Facilities	T	N	P	N	P	N	N	N
Toilet Facilities	T	T	P/T	T	P/T	P/T	N	N
Competitive Channel	T	T	P	P	P	P	N	N
Lower Bridge	T	T	T	T	P/T	P/T	N	N
Upper Bridge	T	T	P	P	P	P	N	N

T - Temporary

P - Permanent

N - Not Present

RB - Right Bank

LB - Left Bank

Table II.D.-1
Comparison of Alternative Effects to Scoping Issues

Issue/ Resource Category¹	Alternative 1	Alternative 2	Alternative 3 Proposed Action	Alternative 4 No Action
Air Quality	<ul style="list-style-type: none"> • Fugitive dust from construction • Vehicle engine combustion 	<ul style="list-style-type: none"> • Fugitive dust from construction • Vehicle engine combustion 	<ul style="list-style-type: none"> • Fugitive dust from construction • Vehicle engine combustion 	<ul style="list-style-type: none"> • No effect • Vehicle engine combustion
Traffic and Transportation	<ul style="list-style-type: none"> • Limited on-site parking • Level of service decrease • Bus - tractor trailer conflicts • 43 autos/ 6 trucks on U.S. 64 west during peak hour • 4,800 truckloads of spoil during reconditioning 	<ul style="list-style-type: none"> • Limited on-site parking • Level of service decrease • Bus - tractor trailer conflicts • 57 autos/12 trucks on U.S. 64 west during peak hour • 650 truckloads of spoil during reconditioning 	<ul style="list-style-type: none"> • Limited on-site parking • Level of service decrease • Bus - tractor trailer conflicts • 61 autos/15 trucks on U.S. 64 west during peak hour. • 0 truckloads of spoil during reconditioning 	<ul style="list-style-type: none"> • Traffic increase above baseline. • LOS decrease • No effect • No effect • No effect
Socio-Economics⁽²⁾ (Construction)	<ul style="list-style-type: none"> • Net local fiscal effect - \$97,000⁽³⁾ • \$3.1 million increase in local sales • 159 additional jobs • Population increase - 72 	<ul style="list-style-type: none"> • Net local fiscal effect - \$131,000 • \$4.1 million increase in local sales • 215 additional jobs • Population increase - 98 	<ul style="list-style-type: none"> • Net local fiscal effect - \$139,000 • \$4.4 million increase in local sales • 227 additional jobs • Population increase - 103 	<ul style="list-style-type: none"> • No effect • No effect • No effect • No effect
Socioeconomics (Operation)	<ul style="list-style-type: none"> • Net local fiscal effect - \$46,000 • \$16.9 million increase in retail sales • 145 additional jobs • Population increase - 0 	<ul style="list-style-type: none"> • Net local fiscal effect - \$46,000 • \$16.9 million increase in retail sales • 145 additional jobs • Population increase - 0 	<ul style="list-style-type: none"> • Net local fiscal effect - \$46,000 • \$16.9 million increase in retail sales • 145 additional jobs • Population increase - 0 	<ul style="list-style-type: none"> • No effect • No effect • No effect • No effect

Table II.D.-1 - Continued
Comparison of Alternative Effects to Scoping Issues

Issue/ Resource Category¹	Alternative 1	Alternative 2	Alternative 3 Proposed Action	Alternative 4 No Action
Recreation	<ul style="list-style-type: none"> • Temporary loss of 3 recreation opportunities • Gain of 2 recreation opportunities • Temporary recreation experience ROS condition 17/56⁽⁴⁾ • Long-term recreation experience ROS condition 0/28⁽⁴⁾ 	<ul style="list-style-type: none"> • Temporary loss of 3 recreation opportunities • Gain of 5 recreation opportunities • Temporary recreation experience ROS condition 17/56 • Long-term recreation experience ROS condition 2/28 	<ul style="list-style-type: none"> • Temporary loss of 3 recreation opportunities • Gain of 9 recreation opportunities • Temporary recreation experience ROS condition 17/56 • Long-term recreation experience ROS condition 2/28 	<ul style="list-style-type: none"> • No effect • No effect • No effect • No effect
Visual	<ul style="list-style-type: none"> • 1 viewshed affected • No scenic resources affected • No architectural forms affecting site 	<ul style="list-style-type: none"> • 2 viewsheds affected • 1 scenic resource affected • 2 architectural forms affecting site 	<ul style="list-style-type: none"> • 2 viewsheds affected • 1 scenic resource affected • 3 architectural forms affecting site 	<ul style="list-style-type: none"> • No effect • No effect • No effect
Geology and Soils	<ul style="list-style-type: none"> • Maximum of 7.2 acres of vegetation cleared • Grading - 3,550 cy • Earth fill - 4,050 cy • Limestone fill - 60,800 tons • Boulders collected from riverbed - 12,000 tons • Post-Olympic material mobilization - 72,000 cy 	<ul style="list-style-type: none"> • Maximum of 10.2 acres of vegetation cleared • Grading - 13,926 cy • Earth fill - 9,124 cy • Limestone fill - 118,900 tons • Boulders collected from riverbed - 12,400 tons • Post-Olympic material mobilization - 10,000 cy 	<ul style="list-style-type: none"> • Maximum of 12.5 acres of vegetation cleared • Grading - 11,730 cy • Earth fill - 8,474 cy • Limestone fill - 149,300 tons • Boulders collected from riverbed - 12,400 tons • Post-Olympic material mobilization - 10,000 cy 	<ul style="list-style-type: none"> • No effect • No effect • No effect • No effect • No effect • No effect

Table II.D.1 - Continued
Comparison of Alternative Effects to Scoping Issues

Issue/ Resource Category ¹	Alternative 1	Alternative 2	Alternative 3 Proposed Action	Alternative 4 No Action
Hydrology	<ul style="list-style-type: none"> • No decrease in ground permeability/increase in runoff from baseline • Decrease in water availability from Ocoee No. 3 Reservoir - 6.7% • Increase in maximum water depth - 46% above baseline • Expected pH (construction/reconditioning) 6.34 - 6.35 • Increase in suspended solids during construction 28% above baseline • Increase in suspended solids during reconditioning - 399% above baseline 	<ul style="list-style-type: none"> • Decrease in ground permeability/increase in runoff - 2.6% above baseline • Decrease in water availability from Ocoee No. 3 Reservoir - 6.7% • Increase in maximum water depth - 46% above baseline • Expected pH (construction/reconditioning) 6.32 - 6.34 • Increase in suspended solids during construction 85% above baseline • Increase in suspended solids during reconditioning - 54% above baseline 	<ul style="list-style-type: none"> • Decrease in ground permeability/increase in runoff - 6.4% above baseline • Decrease in water availability from Ocoee No. 3 Reservoir - 6.7% • Increase in maximum water depth - 46% above baseline • Expected pH (construction/reconditioning) 6.32 - 6.37 • Increase in suspended solids during construction 74% above baseline • No increase in suspended solids during reconditioning 	<ul style="list-style-type: none"> • No effect • No effect • No effect • No effect • No effect • No effect
Biological Resources				
Aquatic	<ul style="list-style-type: none"> • Minimal effects on downstream biota • Minimal modification to substrate availability for benthic organisms • Minimal adverse effect • Riparian wildlife species habitat lost - 7.2 ac 	<ul style="list-style-type: none"> • Minimal effects on downstream biota • Significant modification to substrate availability for benthic organisms • Minimal adverse effect • Riparian wildlife species habitat lost - 10.2 ac 	<ul style="list-style-type: none"> • Minimal effects on downstream biota • Significant modification to substrate availability for benthic organisms • Minimal adverse effect • Riparian wildlife species habitat lost - 12.5 ac 	<ul style="list-style-type: none"> • No effect • No effect • No effect • No effect
Wildlife				

Table II.D.-1 - Continued
Comparison of Alternative Effects to Scoping Issues

Issue/ Resource Category¹	Alternative 1	Alternative 2	Alternative 3 Proposed Action	Alternative 4 No Action
Vegetation	<ul style="list-style-type: none"> Partial loss of habitat in stand 1 - compartment 320; minimal effects to stands 2 and 3 Some loss of habitat in stands 11 and 9 - compartment 330 Some loss of habitat in stands 11 and 29 - compartment 364 	<ul style="list-style-type: none"> Partial loss of habitat in stand 1 - compartment 320; minimal effect to stands 2 and 3 Some loss of habitat in stands 11 and 9 - compartment 330 Some loss of habitat in stands 11 and 29 - compartment 364 	<ul style="list-style-type: none"> Partial loss of habitat in stand 1 - compartment 320; minimal effects to stands 2 and 3 Some loss of habitat in stands 11 and 9 - compartment 330 Some loss of habitat in stands 11 and 29 - compartment 364 	<ul style="list-style-type: none"> No effect No effect No effect
Threatened and Endangered Species (TES)	<ul style="list-style-type: none"> Federal TES plant species adversely affected - 0 Candidate federally listed TES plant species adversely affected - 0 Sensitive plant species adversely affected - 3 Federally listed TES animal species adversely affected - 0 Candidate federally listed TES animal species adversely affected - 0 Sensitive animal species adversely affected - 0 Sensitive species habitat destroyed <.1 ac Sensitive species habitat altered <.1 ac 	<ul style="list-style-type: none"> Federal TES plant species adversely affected - 0 Candidate federally listed TES plant species adversely affected - 0 Sensitive plant species adversely affected - 3 Federally listed TES animal species adversely affected - 0 Candidate federally listed TES animal species adversely affected - 0 Sensitive animal species adversely affected - 0 Sensitive species habitat destroyed <.1 ac Sensitive species habitat altered <.1 ac 	<ul style="list-style-type: none"> Federal TES plant species adversely affected - 0 Candidate federally listed TES plant species adversely affected - 0 Sensitive plant species adversely affected - 3 Federally listed TES animal species adversely affected - 0 Candidate federally listed TES animal species adversely affected - 0 Sensitive animal species adversely affected - 0 Sensitive species habitat destroyed <.1 ac Sensitive species habitat altered <.1 ac 	<ul style="list-style-type: none"> No effect No effect No effect No effect No effect No effect No effect No effect
Wetlands	<ul style="list-style-type: none"> Palustrine wetlands lost - 0 ac Palustrine wetlands disturbed or altered - 9 (0.4 ac) Riverine wetlands lost or altered - 2 (0.6 ac) 	<ul style="list-style-type: none"> Palustrine wetlands lost - 0 ac Palustrine wetlands disturbed or altered - 9 (0.4 ac) Riverine wetlands lost or altered - 2 (0.6 ac) 	<ul style="list-style-type: none"> Palustrine wetlands lost - 0 ac Palustrine wetlands disturbed or altered - 9 (0.4 ac) Riverine wetlands lost or altered - 2 (0.6 ac) 	<ul style="list-style-type: none"> No effect No effect No effect

Table II.D-1 - Continued
Comparison of Alternative Effects to Scoping Issues

Issue/ Resource Category ¹	Alternative 1	Alternative 2	Alternative 3 Proposed Action	Alternative 4 No Action
Cultural Resources	<ul style="list-style-type: none"> • Sites affected - 4 (1 adversely affected, 3 no effect) 	<ul style="list-style-type: none"> • Sites affected - 4 (1 adversely affected, 3 no effect) 	<ul style="list-style-type: none"> • Sites affected - 4 (1 adversely affected, 3 no effect) 	<ul style="list-style-type: none"> • Sites affected - 4 (1 adversely affected, 3 no effect)
Facilities⁽⁵⁾	<ul style="list-style-type: none"> • Clearing - 7.2 ac • Grading - 3,550 cy • Earth fill - 4,050 cy • Stone fill (channel) - 60,800 tons • Stone fill (general) - 0 tons • Retaining walls - 1,200 lf • Stone paving - 81,000 sf • Asphalt paving - 0 lf • Temporary facilities - 201,040 sf • Permanent facilities - 0 sf • Spoil disposal - 72,100 cy 	<ul style="list-style-type: none"> • Clearing - 10.2 ac • Grading - 13,926 cy • Earth fill - 9,124 cy • Stone fill (channel) - 95,900 tons • Stone fill (general) - 23,000 tons • Retaining walls - 5,680 lf • Stone paving - 84,500 sf • Asphalt paving - 24,850 lf • Temporary facilities - 192,140 sf • Permanent facilities - 13,920 sf • Spoil disposal - 9,700 cy 	<ul style="list-style-type: none"> • Clearing - 12.5 ac. • Grading - 11,730 cy • Earth fill - 8,474 cy • Stone fill (channel) - 95,900 tons • Stone fill (general) - 53,400 tons • Retaining walls - 3,700 lf • Stone paving - 83,400 sf • Asphalt paving - 71,944 lf • Temporary facilities - 192,640 sf • Permanent facilities - 16,740 sf • Spoil disposal - 0 cy 	<ul style="list-style-type: none"> • No effect • No effect • No effect • No effect • No effect • No effect • No effect • No effect • No effect • No effect • No effect

- (1) Issues/Resource categories included in this Table are limited to those identified during the scoping process. Resource categories not identified as issues during scoping are addressed in detail in Chapters III and IV of this EIS.
- (2) Economic impacts presented in this EIS are limited to the effects of developing, operating, and rehabilitating the Olympic whitewater course within a four county region of influence. This limited area was chosen to disclose the economic impacts at the local level. Economic impacts to other counties and to the State of Tennessee were projected by KPMG Peat Marwick in the "1996 Summer Olympic Games Canoe/Kayak Whitewater Slalom Event Feasibility Analysis."
- (3) Net local fiscal effect is the difference between incremental revenues accruing to local governments due to the project, minus additional expenditures resulting from the project.
- (4) The fraction represents the number of negative effect changes to the Recreation Opportunity Spectrum (ROS) site indicators caused by the action effect/the total number of site indicators inventoried.
- (5) All quantities are taken from the Design Report (USDA, 1993).

appropriate mitigation measures which are encompassed by NEPA regulations (40 CFR 1502.14(f) and 1508.20). Additional measures incorporated into this section emphasize applicable Forest-wide management standards and management MA 5, 11, 17 and 18 prescriptions (FLMRP, Chapter IV).

The following mitigation measures would be implemented to minimize, rectify, avoid, eliminate, and/or compensate for the potential effects on resources identified in Chapter IV (40 CFR 1508.20). The mitigation measures are arranged in the same order as the issues identified in Chapter 1 of this document.

E.1 Air Quality

Combustive emissions from construction vehicles/equipment can be mitigated by efficient scheduling of equipment use, implementing a phased construction schedule to reduce the number of units operating simultaneously, and performing regular vehicle engine maintenance. It is estimated that implementation of these scheduling and maintenance measures would reduce combustive emissions and air quality effects from construction activities associated with the alternatives by 10 to 25 percent.

Operational mitigation measures should focus on transportation planning and management measures to reduce motor vehicle pollution. The purpose of these measures would be to reduce vehicle miles traveled, vehicle trips, peak hour travel, movement at a low rate of speed, and excessive idle time.

The types of operational mitigation measures that could be implemented include: (1) development of the bus shuttle system to serve the venue in order to reduce personal vehicle use, (2) use of offsite parking and parking lot shuttles, and (3) parking lots located and designed to reduce congestion and waiting times.

E.2 Traffic and Transportation

Methods to mitigate safety problems associated with U.S. Highway 64 geometry, and the potential for shuttle bus-tractor trailer conflicts include structural and operational measures. Potential vehicular conflicts are greatest on U.S. 64 west of the venue. Structural improvements to those sections of winding road with narrow turns would reduce accident potential. If these improvements cannot be accomplished, it would be feasible to close the highway to tractor-trailer traffic during pre-Olympic and Olympic events.

Mitigation of effects associated with shuttle buses would be accomplished by conducting a shuttle bus study and developing a spectator transport plan. Insuring a 50-50 split between east and west portals by issuance of parking tickets

specifying a portal would also alleviate bus congestion.

To preclude accidental release of toxic substances, U.S. Highway 64 could be closed to trucks carrying hazardous materials during event periods. Appropriate signage would be used during the construction and operation of the course.

E.3 Socioeconomics

Effects associated with construction and operation of the Olympic Venue would be beneficial to both the local and regional economy, and therefore no mitigation would be required.

E.4 Recreation

The project area would be closed to visitors during construction, and restricted during the pre-Olympic and Olympic events. At other times the area would remain open to public use. Mitigation could be accomplished through aesthetically pleasing screening of unsightly construction areas along U.S. Highway 64, provision of post-construction scenic overlooks, implementation of best management practices during construction, and directing river users to alternative water-play areas downstream of the venue.

E.5 Visual Resources

Area-wide effects on visual resources would be evident during development of the Olympic Venue. Design of the site to accommodate existing topographical features and landforms would minimize disruption of viewsheds. Aesthetic considerations such as using natural stone and wood accessories, should be followed. Care in locating and installing utilities would mitigate visual effects. Replacement of vegetation removed during construction with native plants, and use of native rock and limestone rock as cover for limestone fill in the vicinity of the channel would mitigate adverse effects on the visual character of the site locale.

E.6 Geology and Soils

Acid leachate formation could be minimized by isolation of pyritic material from oxygenated water. This would be accomplished by avoiding excavation of acid producing rock where feasible, performing geotechnical inspections and oversight, sampling and analysis of rock, treating acid rock with crushed limestone, and proper disposal of residual acid-producing materials.

Soil erosion and sedimentation would be mitigated through implementation of best management practices during construction and installation of structural measures to retard erosion and sedimentation.

E.7 Hydrology

Implementation of best management practices would minimize release of sediments during construction and site reconditioning. Incorporating a stormwater management plan into construction plans would determine proper structural measures needed to minimize erosion. Such structural measures could include earth dikes, silt fences, sediment traps and sediment basins. The location and identification of exposed pyritic rocks on venue construction plans would minimize disturbance during construction activities. Revegetating exposed areas immediately after grading would also reduce the erosion potential and excessive scouring of the soil layer during flood events.

Effects on water availability could be mitigated by refining hours necessary to run the competitive channel for pre-Olympic and Olympic events, thus reducing the number of days that releases from Ocoee No. 3 Reservoir would be required.

E.8 Biological Resources

Significant fish and invertebrate communities are not present in the venue location or immediately downstream of the site. However, implementation of best management practices for any disturbance activities would be appropriate. Implementation of a storm water management plan would also reduce the level of effect.

Wildlife populations would not be significantly affected because of the presence of nearby suitable habitat and the regional abundance of species potentially present at the site, and therefore mitigation would not be necessary.

Some habitat destruction and clearing of vegetation would be unavoidable during construction phases of Alternatives 1, 2, and 3. Effects associated with land clearing activities should be minimized, and the areas directly affected should be restored by replanting after the construction phases are completed. Only native species be planted to replace vegetation cleared, to blend with the surroundings.

Minimizing effects to threatened and endangered species would be accomplished by locating and flagging individuals before construction begins and avoiding them, restricting human access to locations supporting TES species, and re-routing trails or constructing walkways to avoid sensitive wetland species. Transplanting could be used as mitigation for some species, but it would not work for others. However, there are no known TES species within the venue site.

Mitigation for disturbance to palustrine wetlands and destruction of riverine wetlands would be accomplished in consultation with the U.S.

Army Corps of Engineers and the USEPA under Section 404 of the Clean Water Act.

E.9 Cultural Resources

To minimize adverse effects on the Old Copper Road, (a site eligible for the National Register of Historic Places) resulting from anticipated construction, mitigation measures will be stipulated in a Memorandum of Agreement (MOA) between the Tennessee State Historic Preservation Officer (SHPO), the Advisory Council on Historic Preservation (ACHP), and the Forest Service. At a minimum, the MOA will include the following stipulations for management of the Old Copper Road: rehabilitation and adaptive reuse of the affected portion of the Old Copper Road where feasible, preparation of an Historic Preservation Plan (HPP), survey and documentation of segments affected, limitation of access, and monitoring of demolition during construction periods. If during construction activities cultural resources are discovered, work will cease immediately and the FS would be notified. Work would resume only upon recommendation of the Forest Archaeologist.

E.10 Facilities

Environmental effects associated with installation and removal of site infrastructure would include implementation of best management practices and prudent scheduling of construction traffic on U.S. Highway 64.

Construction oversight during removal and disposal of spoil materials, using approved methods and locations would result in minimal environmental effect.

F. PROJECT MONITORING AND EVALUATION

Any decision that is implemented on the CNF must comply with FLMRP standards and guidelines. Any alternative that does not comply with the plan must be brought into compliance before it can be implemented. This can happen in two ways. First, the alternative can be changed in order to comply with the standards, guidelines, goals, and objectives of the FLMRP, or second, the FLMRP can be amended to change the site-specific requirements.

Monitoring for this project falls into two categories: implementation and effectiveness monitoring. Implementation monitoring would ensure that the decision is implemented according to the Record of Decision for the project. Since a majority of the work will be contracted, contract specifications would reflect the decision documented in the Record of Decision. During construction, contract compliance checks would ensure compliance with the Record of Decision.

Effectiveness monitoring tracks the effectiveness of the mitigation to ensure that FLMRP goals and objectives are being met. Specifically, all areas with sensitive resources, such as cultural resource sites, sensitive species habitat, and riparian areas potentially affected by Forest users would be monitored to ensure that no significant adverse effect is occurring.

The results of such monitoring would be maintained in project folders by the Forest Service.

G. PREFERRED ALTERNATIVE

The cooperating agencies will develop a preferred alternative following evaluation of responses to the DEIS.

CHAPTER III

AFFECTED ENVIRONMENT

III. AFFECTED ENVIRONMENT

This chapter describes existing environmental conditions within and adjacent to the proposed site of the 1996 Olympic Whitewater Venue. It provides information to serve as a baseline from which to identify and evaluate environmental changes resulting from development of the venue and from holding the Olympic events on the Ocoee River. The description of baseline conditions focuses on the resource categories to be affected by the specific issues identified during the scoping process, as summarized in Chapter I.

A. RESOURCE CATEGORIES TO BE ANALYZED

The scoping process resulted in the identification of issues of environmental concern associated with the proposed action. These issues were grouped by resource category for analysis by the ID Team. For each resource category, a Region of Influence (ROI) was defined. This is the area most likely to be affected by implementation of proposed alternatives. Baseline conditions were developed to be reflective of the ROI for each resource category considered. The following is a discussion of baseline conditions within each affected resource category, with emphasis on the issues identified during the scoping process.

A.1. Air Quality

Air quality in a given location is usually described as the concentrations of various pollutants in the atmosphere, generally expressed in units of parts per million by volume (ppmv) or micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). Air quality is determined by the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions.

The significance of a pollutant concentration is determined by comparing the ambient concentration of that pollutant with the appropriate Federal, State, and local ambient air quality standards. Ambient air quality standards are maximum limits or concentrations of pollutants in air. Federal standards are based on estimates of maximum concentrations that, with an allowance for safety, present no hazard to human health or to the environment.

The Clean Air Act (CAA), as amended in August 1977 and November 1990, provides the basis for regulating air pollution discharges to the ambient atmosphere. Different provisions

of the CAA apply depending on where the source is located, which pollutants are being emitted, and in what amounts. The CAA required EPA to establish ambient ceilings for certain criteria pollutants. Subsequently, EPA promulgated regulations that set national ambient air quality standards (NAAQS). Two classes of standards were established: primary and secondary. Primary standards define levels of air quality necessary, with an adequate margin of safety, to protect public health. Secondary standards define levels of air quality necessary to protect public welfare (e.g., soils, vegetation, and wildlife) from any known or anticipated adverse effects of a pollutant. The State of Tennessee, through the Department of Environment and Conservation (TDEC), has adopted the NAAQS as the State air quality standards.

Air quality standards are currently in place for six pollutants: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), sulfur oxides (SO_x) (measured as sulfur dioxide [SO_2]), lead (Pb) and particulate matter smaller than 10 micrometers (PM-10). The previous NAAQS for particulate matter was based upon total suspended particulate (TSP) levels; it was replaced in July 1987 by an ambient standard based only on the PM-10 fraction of TSP. Table III.A.1-1 depicts federal and state standards for these pollutants. The pollutants of primary concern from this proposal are CO, O_3 , and PM-10. Since lead is not emitted from vehicles or construction associated with the event, it is not considered further in this EIS.

Tennessee has developed a state implementation plan (SIP) as required by Section 110 of the CAA to provide for the implementation, maintenance, and enforcement of the NAAQS within the state. The SIP is the primary vehicle used by the State and EPA for the enforcement of federal air pollution legislation.

For the purpose of air quality analysis, the ROI for O_3 and its precursors (combustion emissions of VOC and NO_x from cars and buses servicing the venue) is defined as the existing airshed surrounding the Ocoee River. This airshed is designated by USEPA as the Eastern Tennessee - Southwestern Virginia Interstate Air Quality Control Region (or Air Quality Control Region [AQCR] #207). For inert pollutants (those that do not participate in photochemical reactions [i.e., all pollutants

TABLE III.A.1-1
State and National Ambient Air Quality Standards

Pollutant	Averaging Time	Tennessee Standards (a,b,c), microgram/cubic meter (ug/m ³)		National Standards (a,b,c), ug/m ³	
		Primary	Secondary	Primary(e)	Secondary(f)
Total Suspended Particulates	AGM (g) 24-hour	75 260	60 150		
PM-10	Annual 24-hour	50 (d) 150 (d)	50 (d) 150 (d)	50 (d) 150 (d)	50 (d) 150 (d)
Sulfur Dioxide	Annual 24-hour 3-hour	80 (0.03 ppmv) 365 (0.14 ppmv)		80 (0.03 ppmv) 365 (0.14 ppmv)	1300 (0.50 ppmv)
Carbon Monoxide	8-hour 1-hour	10,000 (9.0 ppmv) 40,000 (35.0 ppmv)	10,000 (9.0 ppmv) 40,000 (35.0 ppmv)	10,000 (9.0 ppmv) 40,000 (35.0 ppmv)	
Ozone	1-hour	235 (0.12 ppmv(c))	235 (0.12 ppmv(c))	235 (0.12 ppmv(c))	235 (0.12 ppmv(c))
Nitrogen Dioxide	Annual	100 (0.05 ppmv)	100 (0.05 ppmv)	100 (0.053 ppmv)	100 (0.053 ppmv)
Lead	Quarterly	1.5	1.5	1.5	1.5

a National and state standards, other than ozone and those based on an annual/quarterly arithmetic mean, are not to be exceeded more than once per year. The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than 1.

b All measurements of air quality are corrected to a reference temperature of 25 degrees Centigrade and a reference pressure of 760 millimeters of mercury. Ppmv refers to parts per million by volume.

c Arithmetic average.

d Attainment determinations will be made on the criteria contained in 40 CFR 50, July 1, 1987.

e National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health. Each state must attain the primary standards no later than 3 years after the state's implementation plan is approved by EPA.

f National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effect of a pollutant. Each state must attain the secondary standards within a "reasonable time" after the implementation plan is approved by EPA.

g AGM = Annual geometric mean

other than O₃ and its precursors]; combustion emissions of CO and PM-10 from cars and buses servicing the venue, and PM-10 from construction), the ROI is limited to the more immediate area of the 1996 Olympic Venue on the Ocoee River (the area extending a few miles downwind from the mobile sources).

Class I areas are regions in which the air quality is intended to be kept pristine, such as national parks and wildernesses. Mandatory Federal Class I areas of concern are: the Cohutta Wilderness (40 CFR 81.408 Georgia), Great Smoky Mountains National Park (40 CFR 81.422 North Carolina, and 40 CFR 81.428 Tennessee), and Joyce Kilmer-Slickrock (40 CFR 81.422 North Carolina). The remainder of the area of concern is designated Class II by the EPA and the State of Tennessee [Tennessee Air Pollution Control Regulation 1200-3-9-.01(4)(f), Prevention of Significant Air Quality Deterioration, Ambient Air Increments].

A.1.a. Existing Air Quality

According to TDEC, the only Tennessee Class I area within the CNF Ocoee River area is Great Smoky Mountains National Park, approximately 60 miles to the north. The Joyce Kilmer Slickrock, Linville Gorge, Shining Rock, and Cohutta National Wildernesses are also proximate to the Ocoee River area (Godfrey, 1993). The Joyce Kilmer Slickrock Wilderness is approximately 50 miles north of the Cherokee National Forest Ocoee River area. Both the Shining Rock and Linville Gorge National Wildernesses are in northwestern North Carolina (northeast of the Cherokee National Forest Ocoee River area).

Sources of air pollution within the 100 km area are industry, transportation, construction, utilities; and natural sources such as trees, forest fire smoke and ash, wind erosion, and plant pollen.

Local sources of air pollution specific to the proposed Olympic Venue area include motor vehicle exhaust from cars, trucks and buses and the presence of parking and support areas. These sources emit various pollutants to the atmosphere, including nitrogen oxides (NO_x), SO_x, CO, particulates, and hydrocarbons (HC).

The existing air quality of the affected environment is defined by air quality data. Air quality data are obtained by examining records from air quality monitoring stations maintained by the TDEC. Air monitoring data was available from the TDEC for SO₂ and TSP. These

data are presented in Table III.A.1-2 and indicate that neither the SO₂, TSP, or PM-10 standards are exceeded. Note that PM-10 is a fraction of TSP; therefore, if the measured value of TSP is below the PM-10 standard, the PM-10 standard is attained. Polk County is classified as attainment for TSP. Polk County does not meet the primary or secondary standards for SO₂, and is classified as nonattainment for NO₂ (40 CFR 81). Polk County is unclassified for O₃ and CO, and is not designated for Pb. TDEC noted Polk County is still classified nonattainment with regard to SO₂ even though monitoring data for 1989, 1990, and 1991 indicate Polk County is in compliance with the state and national ambient air quality standards. The state has asked EPA to reclassify the area as attainment for SO₂ in 1992/93; however, emergency episodes have interfered with this process. An area must demonstrate compliance for 3 years prior to being reclassified.

A.2. Traffic and Transportation

This section addresses existing traffic and transportation conditions related to roadways, parking, mass transit, and railroads. The ROI for the transportation analysis includes the area surrounding U.S. Highway 64 between Cleveland, Tennessee and Ducktown, Tennessee, a distance of approximately 35 miles (Figure III.A.2-1).

A.2.a. Roadways and Roadway Improvements

The transportation analysis focuses on U.S. Highway 64, the primary east-west arterial serving the proposed 1996 Olympic Venue. In the vicinity of the Olympic site, U.S. Highway 64 intersects I-75 in Cleveland, U.S. 411 near Ocoee, Tennessee, and U.S. 19 to the west of Murphy, North Carolina. Each of these intersected roads are major north-south interstate routes in the ROI. Local residents utilize U.S. Highway 64 for inter-county travel and emergency vehicular access, as well.

U.S. Highway 64 is used for a variety of purposes in the region. Whitewater outfitters use the road to transport busloads of raft and kayak patrons to various points on the Ocoee River. Heavy trucks use the route for transporting lumber and other products through southern Tennessee. Toxic materials are often transported by truck on U.S. Highway 64 from manufacturing plants located south of Ducktown. Tourists use the road to access the

TABLE III.A.1-2
Tennessee Department of Environment and Conservation (TDEC) Ambient Air Monitoring Data

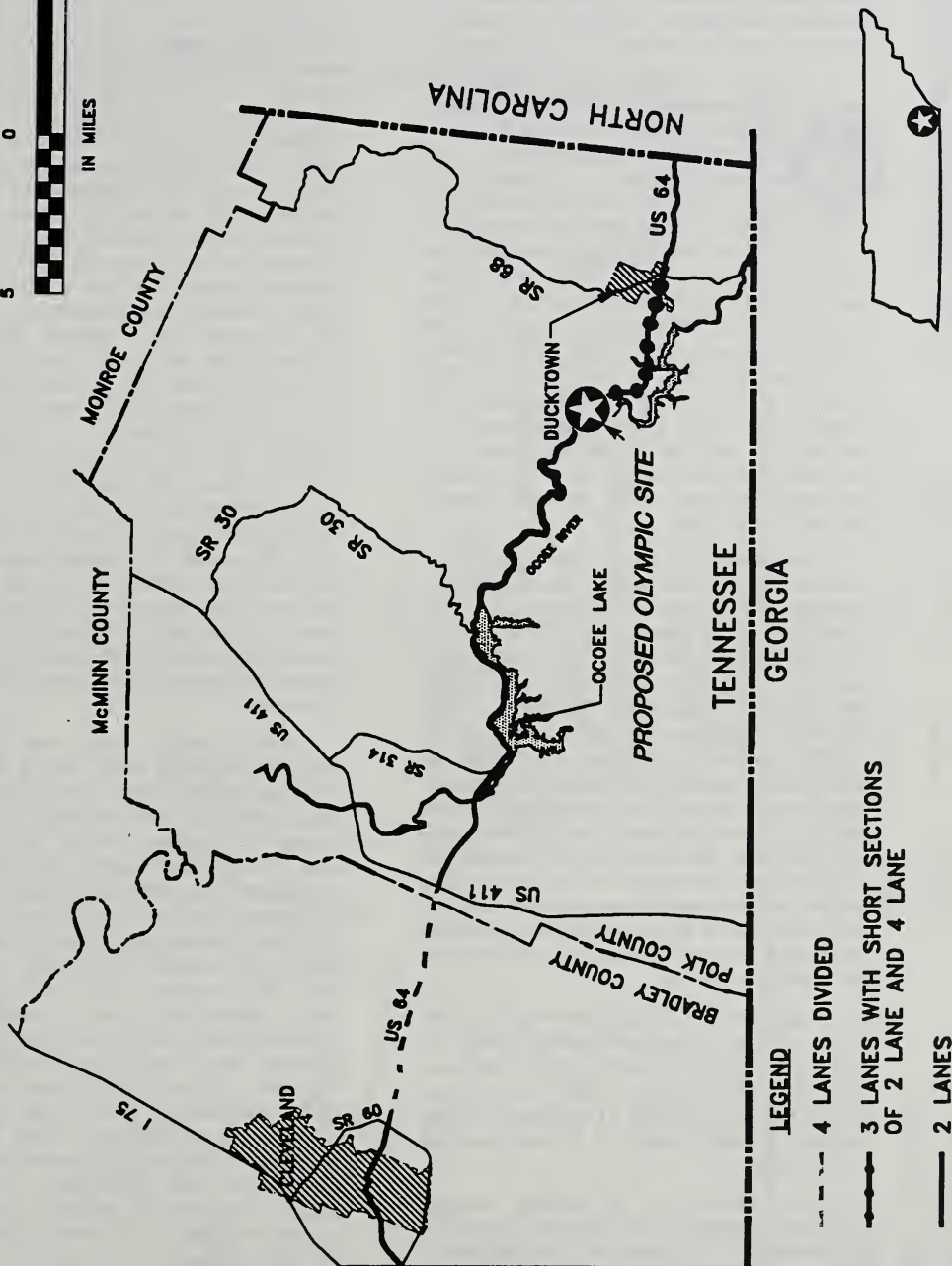
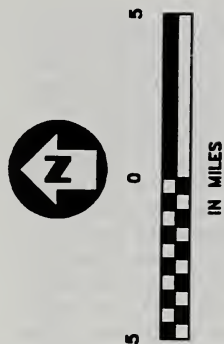
Pollutant	Year	Concentration, micrograms/cubic meter ($\mu\text{g}/\text{m}^3$)	
		24-Hour Average	Annual Arithmetic Mean
Sulfur Dioxide ^(a)	1991	124	18
	1990	102	21
	1989	111	19
Total Suspended Particulates ^(b)	1991	89	27
	1990	54	29
	1989	81	28

a Monitoring station: Martin Campbell Airport, Polk County, TN

b Monitoring station: Copperhill Elementary School on Highland, Polk County, TN

Source: EPA Aerometric Information Retrieval System (AIRS), Air Quality Subsystem, Quick Look Report obtained from Jackie Waynech, State of Tennessee, Department of Environment and Conservation (TDEC)

Figure III. A. 2-1
TRANSPORTATION REGION OF INFLUENCE
U.S. 64



Great Smoky Mountain National Park and other attractions in the area. It also serves as a major east-west route for local traffic in Polk County.

For the approximate 9-mile distance between Cleveland and U.S. 411, U.S. Highway 64 is a four-lane divided road with a wide median and near-expressway characteristics. The road travels over rolling terrain. Approximately 0.5 mile east of U.S. 411, the four-lane divided road becomes a two-lane mountain road with a 45 mile-per-hour speed limit and no passing allowed. The section of U.S. Highway 64 to the east of U.S. 411 is also designated as a National Forest Scenic Byway. This route, designated in 1989, is the first National Forest Scenic Byway in the United States. To the east of State Route (S.R.) 314, U.S. Highway 64 becomes more winding and closely follows the alignment of the Ocoee River. Travel lanes are generally 12 feet wide, but shoulders vary from 10 feet to 0 feet, with frequent vertical drop-offs directly into the Ocoee River.

To the east of S.R. 30, U.S. Highway 64 travels through Ocoee Gorge. Travel lanes are generally 12 feet wide, but shoulders are usually nonexistent. The general speed limit remains 45 miles per hour, but this speed is difficult to attain, as curves with limits as low as 15 miles per hour are frequently encountered. A Tennessee Department of Transportation (TDOT) study of U.S. Highway 64 through the Ocoee Gorge indicates that tractor-trailer trucks must cross the center line to successfully negotiate at least one of these curves, thereby making it difficult for two trucks to pass on this curve without an accident. A typical cross-section in the gorge would show a vertical cliff directly adjacent to the north edge of pavement, and a sheer drop-off into the Ocoee River along the south right-of-way.

Approximately 8 miles east of S.R. 30, the road widens to a four-lane, divided facility for about 2 miles to the vicinity of the proposed Olympic Venue location. From this point to Ducktown, U.S. Highway 64 becomes a rolling two-and three-lane road with 12-foot lanes and wide shoulders.

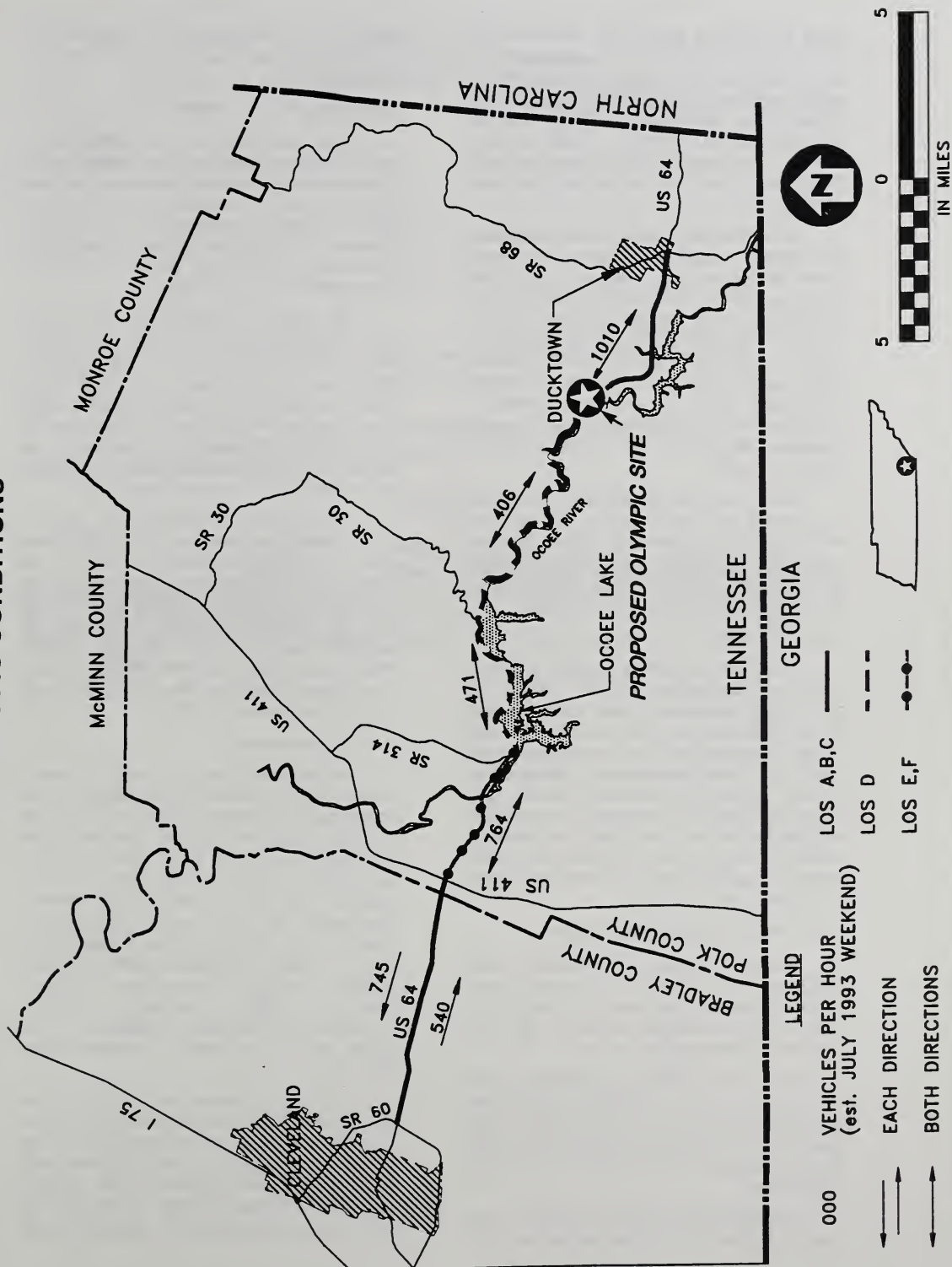
The evaluation of the existing roadway conditions focuses on the carrying capacity of the existing U.S. Highway 64 road alignment, the level of service (LOS) of U.S. Highway 64, and accident statistics associated with the facility. Appendix G-3 provides detailed information on the LOS and capacity of U.S. Highway 64.

The latest traffic counts available were provided by TDOT. In October 1991, daily traffic counts ranged from 3,490 vehicles just west of S.R. 30 to 10,840 vehicles to the west of U.S. 411. The peak traffic hour during the day was between 5:00 and 6:00 p.m. Peak-hour volumes ranged from 284 vehicles to the east of S.R. 30 to 898 vehicles to the west of U.S. 411. The peak-hour traffic averaged 8.3 percent of the daily traffic in the area. An exception was the section of U.S. Highway 64 just west of S.R. 68, which showed 16 percent of its daily traffic occurring during the afternoon peak hour. This higher percentage was assumed to be a result of the industrial and business traffic from Copperhill and McCaysville returning home to the residential area west of Ducktown, and traffic from the industrial park west of Ducktown. Directional split during the peak hour was not available for the area near the proposed Olympic Venue, but was consistently in the range of 58 percent westbound on the four-lane sections east of Ducktown and west of U.S. 411. Thus, 58 percent is reasonably assumed to be the westbound directional split for the entire roadway. Near Cleveland, the peak-hour directional split reverses, and approximately 53 percent of the traffic is eastbound. The peak hour to daily traffic ratio also increases slightly near Cleveland.

Historic traffic counts were analyzed to determine vehicular traffic rate of increase for U.S. Highway 64 traffic over the last 6 years. The analysis indicated that traffic has grown an average of 3 percent annually during that period. TDOT also provided a table of factors that related day of the week and month of the year to an average annual daily traffic (AADT) volume. This table and the growth factor were used to convert the October 1991 traffic volumes to July 1993 weekend traffic estimates. These traffic volumes will provide a proper base for forecasting background traffic for the proposed Olympic event, to be held on a weekend in late July 1996. Figure III.A.2-2 shows the existing traffic volumes and LOS in the area. LOS ranges from free-flowing (A and B) on the three-lane section near Ducktown and the four-lane section near Cleveland, to bumper-to-bumper congestion (E and F) on the two-lane sections between U.S. 411 and the venue.

The accident rate for the section of U.S. Highway 64 near the venue was reported by TDOT as 2.58 accidents per million vehicle miles during the period from January 1, 1987 to November 22, 1988. This is above the statewide average of 1.84 accidents per million vehicle

Figure III. A. 2-2
1993 TRAFFIC CONDITIONS



miles for two-lane rural roads and above the critical rate of 2.45. TDOT has indicated that the accident rate in the Ocoee Gorge has recently improved to 0.49 accidents per million vehicle miles, which is much better than the statewide average. However, TDOT indicates that there are several specific curves in Ocoee Gorge that create most of the accident problems.

As U.S. Highway 64 is a designated truck route and is the main east-west road in southern Tennessee; heavy trucks make up a significant percentage of the total traffic. Near the proposed venue, heavy vehicles comprise nearly 17 percent of the total traffic, according to information collected in 1990 by TDOT. Tractor-trailer combinations make up nearly 70 percent of the heavy vehicles in this area, according to the same survey. In the four-lane section near Cleveland, the percentage of heavy vehicles drops to 6 percent.

TDOT also plans to improve U.S. 411 to four lanes for an extended distance to the north of U.S. Highway 64 and to provide a two-lane bypass around Copperhill, Tennessee (just south of Ducktown). Neither of these improvements are currently scheduled for construction.

A.2.b. Parking

Availability of parking facilities is limited due to the mountainous terrain. Only a few parking areas are located within a short distance of the proposed site. The proposed Olympic Venue alternatives identify a small parking area on-site that could accommodate approximately 25 cars. Boyd's Gap Overlook, several miles east of the Olympic Venue, could accommodate one hundred cars or more if both the paved and unpaved areas were used. There also is a paved area to the east of Boyd's Gap that could possibly accommodate 120 cars.

A.2.c. Other Transportation Modes

There is currently no scheduled mass transit in the area. However, whitewater rafting outfitters routinely use buses to transport as many as 6,000 customers per day to and from the river put-in and take-out sites.

There are no railroad rights-of-way in the vicinity of the venue. Railroad rights-of-way parallel sections of U.S. 411 and S.R. 68. These tracks are connected by another track that parallels the Hiwassee River to the north of the Ocoee River.

U.S. Highway 64 does not provide bicycle lanes or sidewalks for pedestrians or bicyclists.

Walking or bicycling along U.S. Highway 64, particularly in the Ocoee Gorge, is considered dangerous.

A.3. Noise

Noise standards vary depending on the type of land use being affected. The Federal Noise Abatement Criteria are shown in Table III.A.3-1. TDOT has indicated the majority of the U.S. Highway 64 corridor is in category B. Therefore, it is assumed that the existing noise levels along U.S. Highway 64 do not exceed 70 (A-weighted decibels or (dBA)).

The Little Frog Wilderness and the Big Frog Wilderness are in the vicinity of the study area (see Figure III.A.4-1). The Big Frog Wilderness is 2 miles south of U.S. Highway 64 and is not affected by highway traffic noise. The Little Frog Wilderness is located along the north side of U.S. Highway 64 just east of the venue. TDOT indicates that these wildernesses are in category B for noise effects.

An analysis of existing traffic noise on U.S. Highway 64 indicated that 70-dBA noise levels occurred approximately 70 feet from the centerline through the gorge, approximately 80 feet from the centerline between S.R. 314 and U.S. 411, and approximately 57 feet from the centerline west of U.S. 411. As similar effects would occur in the Little Frog Wilderness, only a very small portion of the site should be affected at levels above 70 dBA.

A.4. Socioeconomics

The proposed Olympic Venue is located in the Southeast Tennessee Valley Region, a 21-county area encompassing parts of Tennessee, North Carolina, and Georgia. This area is predominantly rural, with large tracts of forested land being managed by the Forest Service, National Park Service, and private interests. The largest city in the area is Chattanooga, Tennessee. The region is within 3 hours driving time of other metropolitan areas, including Atlanta, Georgia; Birmingham, Alabama; Asheville, North Carolina; Knoxville, Tennessee; and Nashville, Tennessee. A regional map of the area is provided Figure III.A.4-1.

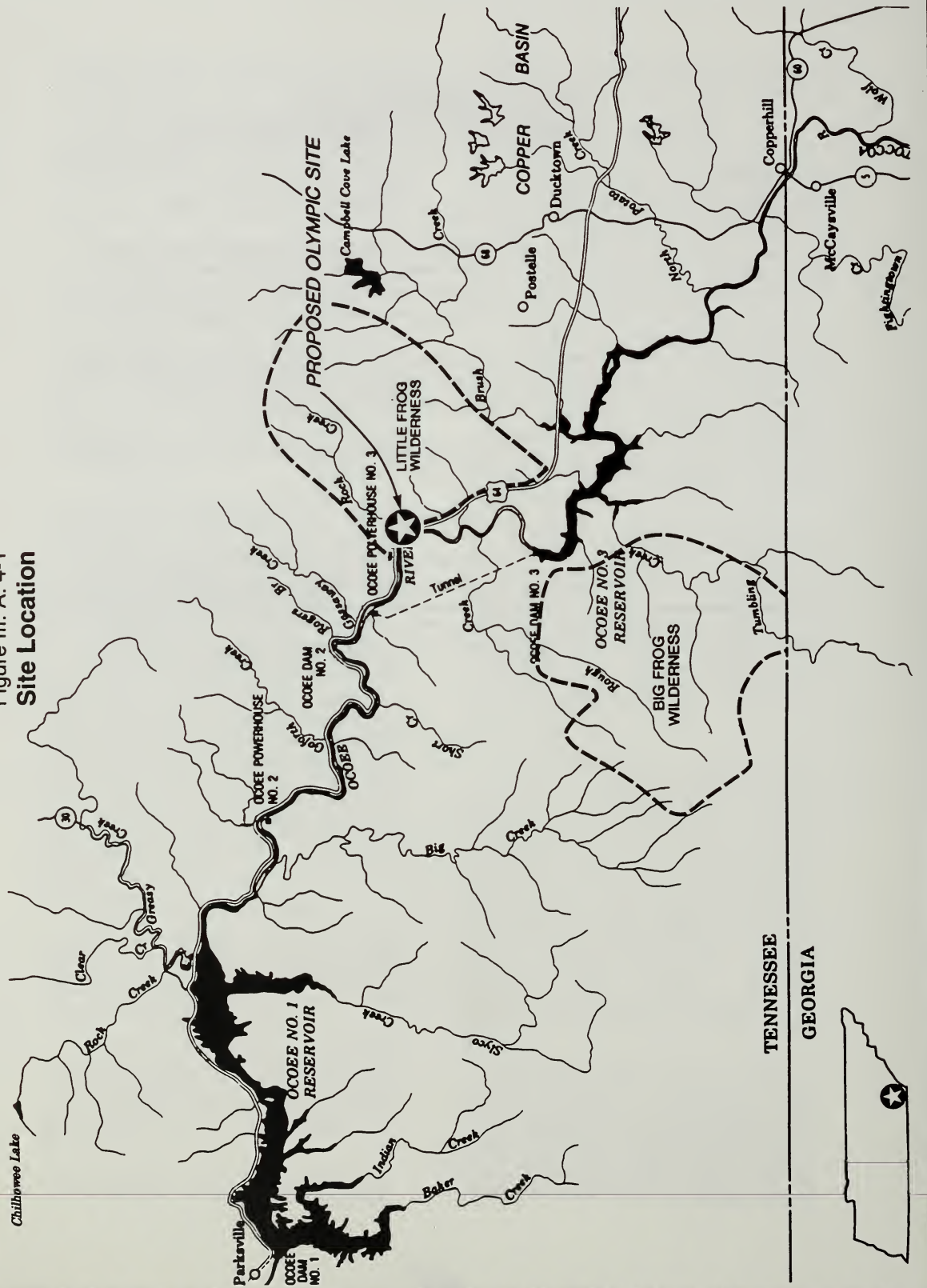
The direct economic and social effects of the proposed Olympic events and related activities are expected to be most notable in Polk County. Polk County has limited infrastructure, and therefore direct effects of the Olympic event would be most notable. While only significant effects can impact the carrying capacity

TABLE III.A.3-1
NOISE ABATEMENT CRITERIA
HOURLY A-WEIGHTED SOUND LEVEL - DECIBELS (dBA)

Activity Category	L10(h) ^a	Description of Activity Category
A	60 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	70 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	75 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	55 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

a The time-varying noise level which would be exceeded 10 percent of the time for a 1 hour period.
Source: *"Procedures for Abatement of Highway Traffic Noise and Construction Noise"*, 23 CFR 722, August 8, 1982.

Figure III. A. 4-1
Site Location



of infrastructure serving large, urban areas, even the slightest of direct effects will be notable on systems with limited capacities. Direct effects are also anticipated to occur in three adjacent counties: Bradley County, Tennessee; Cherokee County, North Carolina; and to a lesser extent, Fannin County, Georgia. This four-county area has been defined as the ROI for purposes of analyzing and identifying potential socioeconomic effects. Identification of the ROI was based on an analysis of residential location, economic linkages, public facilities, service providers, and commuting patterns. Polk and Bradley Counties have been identified as the appropriate primary focus of the analysis of existing regional socioeconomic conditions, also termed the affected environment.

A.4.a. Demographics

The resident population of the four-county ROI was 123,517 persons in 1990, an increase of 8,687 persons over the 1980 population of 114,830, according to the U.S. Department of Commerce, Census Bureau. The most populous county, Bradley County, had a reported population of 67,547 residents in 1980 and 73,712 in 1990. Bradley County experienced the largest population increase and average annual growth rate during the 1980s, with a 9 percent net gain in resident population. Polk County remained the least populous county in the region, with a net increase of 41 residents in the 1980s and a reported population of 13,643 in 1990. The other counties in the region, Cherokee County, North Carolina, and Fannin County, Georgia, also realized gains in resident population. Cherokee County increased from 18,933 residents in 1980 to 20,170 in 1990, and Fannin County increased from 14,748 to 15,992. Table III.A.4-1 indicates reported resident population estimates and changes in the ROI and the cities and counties between 1970 and 1990.

Population change in the 11 incorporated municipalities and unincorporated areas in the ROI varied during the 1980s. The cities ranged in population from 153 in Mineral Bluff (Fannin County) to 30,359 in Cleveland, according to the 1990 census. Eight of the 11 cities in the ROI declined in resident population between 1980 and 1990. Only Cleveland, Mineral Bluff and Morganton (Fannin County) gained population during the decade. Cleveland increased by 3,944 residents, Mineral Bluff gained 23, and Morganton gained 32. Cleveland, the largest city in the ROI, increased 14.9 percent in population. Almost 38 percent of the population growth in the ROI occurred in the unincorporated areas of the counties, ranging from 382

additional residents in Polk County to 2,324 in unincorporated Bradley County. Reportedly, resident population in the unincorporated area of Cherokee County declined due to the separate census count for Andrews in 1990. Previous census counts included the residents of Andrews in the unincorporated total.

Information on the components of resident population change is useful in indicating what type of change is occurring in an area and how a proposed activity might affect population trends. Population increases or decreases as a result of births, deaths, and migration. An excess of births over deaths results in a net natural increase in population. More persons migrating into an area than leaving results in a net migration gain.

The components of resident population change in the four-county ROI from 1980 to 1990 are shown in Table III.A.4-2. Polk County was the only county in the ROI to experience net out-migration, with more residents leaving the county than moving in during the 1980s. The out-migration was offset by a slight population gain due to more births than deaths among county residents during the decade, resulting in a total resident population increase of 41. In Bradley County, about two-thirds of the population growth was due to natural increase. In-migration was the primary reason for population gains in Cherokee and Fannin Counties during this period, responsible for over three-fourths of the increase in both counties.

The age groupings of a resident population is a determining factor in evaluating the demand for public facilities and services in an area. Age groupings for children have been identified for the counties within the ROI for preschool (ages 0 through 5), elementary (ages 6 through 11), middle school (ages 12, 13, and 14) and high school (ages 15 through 17). Age groupings for adults have been identified for the counties within the ROI for 18 through 64 years of age, and those 65 and over. Table III.A.4-3 presents the age groupings in the ROI derived from the 1990 census.

Changes in the regional resident population estimates in the ROI from 1969 to 1989, with the annual deviation and percent deviation are summarized in Appendix G-4. The Economic Impact Forecast System (EIFS), used in this report to estimate the socioeconomic impacts for the ROI, identifies the maximum historic percentage changes, both positive and negative, for various social and economic impact variables (population, employment, in

TABLE III.A.4-1
Resident Population and Change in the ROI, 1970, 1980, 1990

Area	1970	1980	1990	Percent Change 1970-80	Numeric Change 1970-80	Percent Change 1980-90	Numeric Change 1980-90	Percent Change 1970-90	Numeric Change 1970-90
Polk County, TN	11,699	13,602	13,643	16.3	1,903	0.3	41	16.6	1,944
Benton		1,115	992						
Copperhill		418	362						
Ducktown		583	421						
Unincorporated Area		11,486	11,868						
Bradley County, TN	51,145	67,547	73,712	32.1	16,402	9.1	6,165	44.1	22,567
Charleston		756	653			-13.6	-103		
Cleveland		26,415	30,359			14.9	3,944		
Unincorporated Area		40,376	42,700			5.8	2,324		
Cherokee County, NC	16,355	18,933	20,170	15.8	2,578	6.5	1,237	23.3	3,815
Andrews		not inc.	2,551			na	na		
Murphy		2,078	1,575			-24.2	-503		
Unincorporated Area		16,855	16,044			-4.8	-811		
Fannin County, GA	13,405	14,748	15,992	10.0	1,343	8.4	1,244	19.3	2,587
Blue Ridge		1,376	1,336			-2.9	-40		
McCaysville		1,219	1,065			-12.6	-154		
Mineral Bluff		130	153			17.7	23		
Morganton		263	295			12.2	32		
Unincorporated Area		11,760	13,143			11.8	1,383		
ROI	92,604	114,830	123,517	24.0	22,226	7.6	8,687	33.4	30,913
Municipalities		34,353	39,762			15.7	5,409		
Unincorporated Area		80,477	83,755			4.1	3,278		

Sources: U.S. Department of Commerce, Census Bureau, Census of Population, 1970, 1980, 1990.
U.S. Army Corps of Engineers, Economic Impact Forecast System, 1992.

TABLE III.A.4-2
Components of Resident Population Change, Ocoee ROI, 1980-1990

ROI County	Resident Population 1980	Resident Population 1990	1980- 1990 Births	1980- 1990 Deaths	Natural Increase	Net Migration	Total Change	Percent Change	Percent Change/ Natural Increase	Percent Change Due To Migration
Bradley	67,547	73,712	9,482	5,301	4,181	1,984	6,165	9.1	67.8	32.2
Cherokee	18,933	20,170	2,221	1,922	299	938	1,237	6.5	24.2	75.8
Fannin	14,748	15,992	1,810	1,682	128	1,116	1,244	8.4	10.3	89.7
Polk	13,602	13,643	1,631	1,358	273	(232)	41	0.3	665.9	-565.9
Total ROI	114,830	123,517	15,144	10,263	4,881	3,806	8,687	7.6	56.2	43.8

Sources: U.S. Department of Commerce, Census Bureau, Census of Population, 1980, 1990.

TABLE III.A.4-3
Resident Population By Age Group, Ocoee ROI, 1990

Age Group	Polk Number	Polk Percent	Bradley Number	Bradley Percent	Cherokee Number	Cherokee Percent	Fannin Number	Fannin Percent	ROI Number	ROI Percent
0-5	947	6.9	5,864	7.7	1,326	6.6	1,127	7.0	9,084	7.4
6-11	1,021	7.5	6,005	8.1	1,482	7.3	1,272	8.0	9,780	7.9
12-14	607	4.4	3,247	4.4	885	4.4	624	3.9	5,363	4.3
15-17	719	5.3	3,312	4.5	878	4.4	684	4.3	5,593	4.5
(6-17)	(2,347)	(17.2)	(12,564)	(17.0)	(3,245)	(16.1)	(2,580)	(16.1)	(20,736)	(16.8)
18-64	8,385	61.5	47,293	64.2	11,774	58.4	9,457	58.9	76,879	62.3
65+	1,964	14.4	8,171	11.1	3,825	18.9	2,858	17.9	16,818	13.6
Total	13,643	100.0	73,712	100.0	20,170	100.0	15,992	100.0	123,517	100.0

Note: Percents rounded.

Source: U.S. Census Bureau, Census of Population, 1990.

come). These percent changes are transformed into positive and negative percent deviations to establish Rational Threshold Values (RTVs), which serve as "confidence intervals" for the projected changes in the impact variables. The RTVs provide a standard for assessing the degree of significance for the projected changes in impact variables. The average yearly change was 1,845 in the four-county region. The maximum historic positive deviation was 1,255 in 1971, and the maximum historic negative deviation was 1,345 in 1982. The maximum historic percentage deviations were a positive 1.355 percent and a negative 1.156 percent. Any development activity affecting the resident population in the region which exceeds a positive percentage deviation of 1.355 percent or a negative of 0.578 percent would result in a significant effect.

Visitors and seasonal, recreational, or occasional residents are two other population segments which have an effect on the local economy. The Tennessee Department of Tourist Development estimated there were 3.3 million visitors to southeastern Tennessee in 1991, and about 454,100 visited the Ocoee River region. The region is well-promoted as a recreation destination, attracting tourists and persons maintaining dwelling units for seasonal, recreational, or occasional use. Tourism visitors typically are lodged in accommodations which are available for daily and weekly rental, although a small percentage may stay with family or friends who permanently reside in the area. Visitor accommodations include hotels, motels, campsites, and tourist cabins. Persons occupying a unit which is owned for seasonal, recreational or occasional use are present less than 6 months per year, according to the Census Bureau definition.

Within the ROI, there are about 2,888 commercial lodging units and campsites, based on published reports and local interviews. These units include hotels, motels, campsites, and tourist cabins, but not seasonal housing. A peak population estimate for these units is an indicator of the potential effect which visitors may have on the area. It is estimated that there are about 1,800 units available in hotel and motel facilities in the four counties of the ROI, campsites are reported to total 980, and tourist cabins under 100 units. Tourist cabins are usually reported in the census with other housing units held for seasonal, recreational, or occasional use, and are also addressed below in this section for estimating peak nonresident population. Table III.A.4-4 indicates the re-

ported number of lodging units, including campsites, for the ROI and each county and peak visitor population estimates.

The peak nonresident population present in hotels, motels, and campsites is estimated based on assumptions of lodging unit and campsite occupancy and the average number of persons per visiting group. Assuming a peak weekend summer occupancy factor of 95 percent and an average of 2.4 persons per group, this population component would peak at an estimated 7,085 persons (does not include seasonal housing). The peak non-resident population by county is estimated at 1,505 in Polk County; 3,119 in Bradley County; 1,279 in Cherokee County; and 1,182 in Fannin County. This analysis indicates that Bradley County has the greatest accommodations capacity in the ROI.

Another indicator of the potential effect which seasonal or occasional residents have on an area is the number of private housing units reported in the census to be held for seasonal, recreational, or occasional use. The higher this figure is as a percentage of total housing stock, the greater the effect that this type of residency has on the local economy and demand for public services and facilities. While the census does not report when the peak periods of use of these units may occur, peak periods may generally be assumed to coincide with seasonal tourism peaks. An estimate for this population component can be derived based on assumptions of when peak occupancy occurs in these units and the average number of persons in each unit. In the ROI, peak occupancy would be likely to occur on weekends during the summer months, hunting seasons, and during autumn when tree foliage is most colorful.

The number of housing units reported to be held for seasonal, recreational, or occasional use as a percentage of total housing stock in the 1990 Census is as follows: in Polk County, 2.5 percent or 141 units of a total 5,659 units; in Bradley County, 0.2 percent or 65 of a total 29,562 units; in Cherokee County, 12.3 percent or 1,267 of a total 10,319 units; and in Fannin County, 14.4 percent or 1,204 of a total 8,363 units. Assuming a peak weekend summer occupancy factor of 75 percent and an average of 2.5 persons per unit, this population component would peak at an estimated 220 in Polk County; 122 in Bradley County; 2,376 in Cherokee County; and 2,258 in Fannin County. This analysis clearly indicates that seasonal, recreational, or occasional residents are a much more prominent population factor in Cherokee and

TABLE III.A.4-4
Ocoee ROI Visitor Accommodations Units, 1992

County	Lodging	PP(a)	Camp Sites	PP	Cabins	PP	Seasonal Housing	PP	Units	PP
Polk	70	160	566	1,290	24	55	141	220	801	1,725
Bradley	1,257	2,866	111	253	0	0	65	122	1,433	3,241
Cherokee	363	828	173	394	25	57	1,267	2,376	1,828	3,655
Fannin ^(b)	120	274	130	796	49	112	1,204	2,258	1,503	3,440
ROI Total	1,810	4,128	980	2,733	98	224	2,677	4,976	5,565	12,061

^a PP - Peak visitor population.

^b Includes 130 regular campsites, PP adjusted to include motorcycle-only campground.

Fannin Counties than in Polk and Bradley Counties.

A.4.b. Economic Activity

The ROI has been experiencing an increase in jobs in the manufacturing, retail and wholesale trade, services, and finance/insurance/real estate sectors, as indicated by employment and income data. The expansion in these economic sectors has helped to offset job loss in the agricultural sector, which has been declining since the 1960s. As measured by reported earnings, agriculture and mining had declined to the two smallest economic sectors in the region.

A.4.b.1. Employment

Table III-4-5 presents reported labor force and unemployment estimates for the ROI between 1980 and 1991. During this 11-year period, the civilian labor force in the region increased by 8,735 persons, from 51,353 to 60,088, an average annual growth rate of 1.5 percent. More recently, growth in the regional labor force has been much less than 1.0 percent. Bradley County had the highest employment increase, gaining an average of 626 persons in the labor force annually during this period while the unemployment rate in the county declined from 7.5 to 6.7 percent of the labor force. Polk County experienced a decline in the civilian labor force from 5,840 to 4,395 persons between 1980 and 1991, and also experienced an increase in the rate of unemployment from 11.3 to 15.5 percent during this period.

Table III.A.4-6 details reported 1990 employment by industry sector in the four counties and the ROI. Total 1990 employment in the ROI was reported at 51,792. The largest employment sector was manufacturing, with 18,751 employees or 36.2 percent of the total ROI employment. The services and retail trade sectors employed 7,976 and 7,654 persons respectively, and comprised 15.4 percent and 14.8 percent of total employment. Total regional employment in the government sector was 6,936, with over 81.3 percent of the public agency jobs in state and local governments. Over one-half of total government employment was located in Bradley County, with 3,791 public-sector employees.

Table III.A.4-7 shows total regional employment by industry sector for selected years from 1969 to 1990. Employment in the region increased by 14,931 jobs, or 40.5 percent, from 36,861 to 51,792 between 1969 and 1990. This represents an average annual increase of 1.9

percent. During this period, construction-sector employment increased by 1,964 jobs, an average annual rate of 9.8 percent. The services sector gained 3,808 jobs, an average annual rate of 4.4 percent. The retail sector added 3,597 jobs, or 4.2 percent on an average annual basis. Since the late 1960s, employment has declined in the agriculture and mining sectors of the ROI.

Regional employment in the ROI from 1969 to 1989, with the annual deviation and percent deviation is shown in Appendix G-4. The average yearly change in employment was 1,089 in the four-county region. The maximum historic positive deviation was 2,227 in 1972, and the maximum historic negative deviation was 3,857 in 1975. The maximum historic percentage deviations were a positive 5.785 percent and a negative 8.990 percent. Any development activity affecting employment in the region which exceeds a positive percentage deviation of 5.785 percent or a negative of 6.023 percent would result in a significant effect.

A.4.b.2. Income

Regional income has increased steadily since the late 1960s, as measured by total personal income and per capita income. Total personal income has tended to outpace per capita income, indicating that resident population increases have exceeded growth in aggregate incomes. Table III.A.4-8 details total personal income and per capita income in 1969 and 1990. These figures indicate the greatest increases in per capita incomes have occurred in Bradley County with an annual average rate of income growth of greater than 4 percent. Changes in total income greater than increases in per capita income may also be caused by employment increases in lower wage positions relative to higher wage employment, such as occurs with the replacement of manufacturing employment with retail and wholesale trade jobs.

Total regional personal income in the ROI from 1969 to 1989, adjusted to constant 1982 dollars with the annual deviation and percent deviation is shown in Appendix G-4. The average yearly change in adjusted dollars was \$34.09 million in the four-county region. The maximum historic positive deviation was \$59.05 million in 1986, and the maximum historic negative deviation was \$65.36 million in 1974. The maximum historic percentage deviations were a positive 5.678 percent and a negative 7.924 percent. Any development activity affecting total personal income in the region which exceeds a positive percentage de

TABLE III.A.4-5
Average Annual Labor Force And Employment
Ocoee River ROI, 1980, 1985, 1989-1991(a)

County	1980 CLF	1980 Unemp	1980 U/Rate	1985 CLF	1985 Unemp	1985 U/Rate	1989 CLF	1989 Unemp	1989 U/Rate
Fannin	5,693	637	11.2	5,829	502	8.6	7,002	594	8.5
Cherokee	7,160	610	8.5	7,990	720	9.0	8,615	461	5.4
Bradley	32,660	2,440	7.5	36,530	2,880	8.6	37,720	1,663	4.4
Polk	5,840	660	11.3	5,630	700	12.4	3,966	417	10.5
ROI Total	51,353	4,347	8.5	55,979	4,802	8.6	57,303	3,135	5.5

County	1990 CLF	1990 Unemp	1990 U/Rate	1991 CLF	1991 Unemp	1991 U/Rate	Change '80-'91 CLF	Change '80-'91 Unemp	Change '80-'91 U/Rate
Fannin	6,985	518	7.4	6,902	550	8.0	1,209	-87	-3.2
Cherokee	9,342	818	8.8	9,240	839	9.1	2,080	229	0.6
Bradley	39,742	1,863	4.7	39,551	2,628	6.7	6,891	188	-0.8
Polk	4,127	489	11.9	4,395	679	15.5	-1,445	19	2.2
ROI Total	60,196	3,688	6.1	60,088	4,696	7.8	8,735	349	-0.7

a CLF - civilian labor force; Unemp - reported unemployed; U/Rate - percent unemployment rate
1980 - 1990 figures are numerical change over the eleven-year period.

Source: U.S. Department of Commerce, Bureau of Labor Statistics, 1980, 1985, 1989, 1990, 1991.

TABLE III.A.4-6
Annual Average Employment by Industry Sector, by County and ROI, 1990

Industry	Fannin	Cherokee	Bradley	Polk	ROI	Percent
Farming	238	475	998	359	2,070	4.0
Ag. Svcs./Fstry./Fishing	30	80	184	27	321	0.6
Mining	9	60	23	0	92	0.2
Construction	168	561	2,017	175	2,921	5.6
Total Manufacturing	561	2,652	13,734	1,804	18,751	36.2
Non-Durable Goods	510	1,287	6,222	1,685	9,704	18.7
Durable Goods	51	1,365	7,512	119	9,047	17.5
Transp. & Public Util.	202	135	656	181	1,174	2.3
Wholesale Trade	71	160	1,839	39	2,109	4.1
Retail Trade	675	1,372	5,189	418	7,654	14.8
Finance, Ins. & R.E.	95	143	1,354	196	1,788	3.5
Services ^(a)	683	1,068	5,834	391	7,976	15.4
Total Government	812	1,382	3,791	951	6,936	13.4
Federal, Civilian	109	158	387	114	768	1.5
Federal, Military	138	67	273	54	532	1.0
State & Local	565	1,157	3,131	783	5,636	10.9
Total Employment	3,544	8,088	35,619	4,541	51,792	100.00

^a Includes all employment generated by tourism.

Notes: Durable and non-durable goods manufacturing employees are included in total manufacturing.
Federal, state, and local government employees are included in total government.

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Analysis Division, 1991.

TABLE III.A.4-7
ROI Employment By Industry, Selected Years, 1969 - 1990

Industry	1969	1973	1978	1983	1990
Farming	2,725	2,444	2,284	2,148	2,070
Ag. Svcs./Fstry./Fishing	126	7	45	87	321
Mining	511	0	125	60	92
Construction	957	1,921	2,638	2,246	2,921
Total Manufacturing	17,447	20,099	17,318	17,430	18,751
Non-Durable Goods	7,802	9,818	6,473	7,604	9,704
Durable Goods	9,645	10,281	8,515	8,029	9,047
Transp. & Public Util.	582	645	833	970	1,174
Wholesale Trade	766	1,014	1,222	1,749	2,109
Retail Trade	4,057	4,621	6,032	6,328	7,654
Finance, Ins. & R.E.	701	798	1,146	1,351	1,788
Services	4,168	5,253	5,212	6,686	7,976
Total Government	4,428	5,298	6,183	6,386	6,936
Federal, Civilian	560	672	550	661	768
Federal, Military	648	618	487	532	532
State & Local	3,220	4,005	5,151	5,193	5,636
Total Employment	36,861	43,490	43,665	45,649	51,792

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Analysis Division, 1969, 1973, 1978, 1983, and 1990.

TABLE III.A.4-8
Total Personal Income (\$000) and Per Capita Income, By County and Total ROI, 1969 and 1990

County	1969 Total	1969 /Capita	1990 Total	1990 /Capita	Change Total	Percent Change	Change /Capita	Percent /Capita
Fannin	\$30,645	\$2,339	\$66,128	\$4,164	\$35,483	3.7	\$1,825	2.8
Cherokee	38,165	2,356	75,485	3,655	37,320	3.3	1,299	2.1
Bradley	159,069	3,214	390,249	5,228	231,180	4.4	2,014	2.3
Polk	30,733	2,627	60,604	4,317	29,871	3.3	1,690	2.4
ROI Total	\$258,612	\$2,858	\$592,466	\$4,732	\$333,854	4.0	\$1,874	2.4

Notes: Figures not adjusted for inflation.

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Regional Projections, 1990.

viation of 5.678 percent or a negative of 5.309 percent would result in a significant effect.

Regional business volume as indicated by annual nonfarm income in the ROI from 1969 to 1989, adjusted to constant 1982 dollars with the annual deviation and percent deviation is shown in Appendix G-4. The maximum average yearly change in adjusted dollars was \$17.12 million in the four-county region. The maximum historic positive deviation was \$45.74 million in 1972, and the maximum historic negative deviation was \$63.04 million in 1974. The maximum historic percentage deviations were a positive 8.632 percent and a negative 9.989 percent. Any development activity affecting the volume of business in the region which exceeds a positive percentage deviation of 8.632 percent or a negative of 7.423 percent would result in a significant effect.

A.4.c. Housing

The number of housing units in the ROI increased by 22.6 percent during the 1980s, while population increased by only 7.6 percent, according to census of housing data. Table III.A.4-9 presents aggregate housing data for the ROI in 1980 and 1990. Total reported units increased by 9,944, from 43,959 units in 1980 to 53,903 in 1990. This regional trend reflects national conditions affecting demand for housing, including declining household size, later marriages, and more divorces. Vacancies in owner-occupied housing increased, but was offset by shifts toward rental occupancy evident by the decline in rental vacancies. While the number of nonfamily (single persons living alone and one-parent households) households increased by 1,475, family households as a percentage of all households remained unchanged at 81.2 percent, indicating no significant change in the household structure of the region during this period.

Table III.A.4-10 presents aggregate housing data for the four counties and the ROI in 1990. Bradley County, with 29,562 reported housing units, contains almost 55 percent of the housing inventory in the region. Polk County, with 5,659 reported housing units, contains only 10.5 percent of the units. Owner-occupied units comprise most of the inventory, ranging from 62.5 percent in Cherokee County to 74.6 percent in Polk County. The percentage of all vacant units ranged from 6.6 percent in Bradley County (1,958 units) to 24.3 percent in Fannin County (2,029 units). Cherokee County had the most total vacancies (2,353 units), and Polk

County had the least number of vacancies (567 units). Since the census of housing is conducted in April, it is probable that many of the reported vacant units are occupied for seasonal, recreational, or occasional use during peak visitor periods in the summer and fall.

There are approximately 2,888 lodging (nonresident) units and campsites within the ROI, as noted previously. These units include hotels, motels, campsites, and tourist cabins. There are about 1,800 units available in hotel and motel facilities, 980 campsites, and less than 100 tourist cabins, in the four counties of the ROI. The number of housing units reported to be held for seasonal, recreational, or occasional use totals 2,677 units, including 141 units in Polk County, 65 units in Bradley County, 1,267 units in Cherokee County, and 1,204 units in Fannin County. Not all of the lodging units held for seasonal, recreational, or occasional use are likely to be available for occupancy at any given time. However, it can be estimated that 5,565 units in the ROI may be available for nonresident housing (or camping) during peak periods.

A.5. Land Use, Improvements, and Special Uses

This section presents an overview of land use, improvements, and special uses within the ROI and proximate to the site of the proposed Olympic Venue.

A.5.a. Regional Land Use and Development Trends

Developed land uses in the four-county ROI range from urban and suburban development in the Cleveland and Murphy areas, to smaller town centers and predominantly rural patterns in Polk and Fannin Counties. Much of the land area in Bradley and Cherokee Counties also is characteristically rural. The population density is about 1 person per 20.4 acres in Polk County.

Current land uses in the ROI are primarily for forestry and agriculture. More than half of the ROI is National Forest Land. Areas of more dense development can be found in the urbanized areas surrounding Cleveland in Bradley County, Benton and Ducktown in Polk County, Andrews and Murphy in Cherokee County, and McCaysville and Blue Ridge in Fannin County. Bradley County has been changing from a predominantly rural area as increasing suburbanization has occurred, especially along the I-75 and U.S. Highway 64 corridors.

TABLE III.A.4-9
ROI Housing Data, 1980 and 1990

	1980	1990	Change	Percent Change
Population	114,830	123,517	8,687	7.6
Families	32,468	38,827	6,359	19.6
Households	40,002	47,836	7,834	19.6
Housing Units	43,959	53,903	9,944	22.6
Owned	30,386	36,499	6,113	20.1
Occupied	29,842	34,982	5,140	17.2
Vacant	544	1,517	973	178.9
Rented	11,319	12,887	1,568	13.9
Occupied	10,160	12,014	1,854	18.3
Vacant	1,159	873	286	-24.7
Other	2,254	4,517	2,263	100.4
Occupied	0	0	0	0.0
Vacant	2,254	4,517	2,263	100.4

Source: U.S. Bureau of Census, Census of Housing 1980, 1990.

TABLE III.A.4-10
Housing Data by County, 1990

	Polk	Bradley	Cherokee	Fannin	ROI
Population	13,643	73,712	20,170	15,992	123,517
Families	4,257	23,045	6,495	5,022	38,827
Households	5,129	28,242	8,068	6,397	47,836
Housing Units	5,659	29,562	10,319	8,363	53,903
Owned	4,368	19,979	6,662	5,490	36,499
Occupied	4,220	19,001	6,454	5,307	34,982
Vacant	148	978	208	183	1,517
Rented	993	8,965	1,782	1,147	12,887
Occupied	872	8,603	1,512	1,027	12,014
Vacant	121	362	270	120	873
Other	298	618	1,875	1,726	4,517
Occupied	0	0	0	0	0
Vacant	298	618	1,875	1,726	4,517

Source: U.S. Bureau of Census, Census of Housing 1980, 1990.

Located within the ROI are portions of the Cherokee, Chattahoochee, and Nantahala National Forests. These public lands are not available for urban-scale development. Approximately 80 percent of the lands in Polk County, 50 percent of Bradley County, greater than 50 percent of Fannin County, and greater than 85 percent of Cherokee County are classified as either timber or agricultural land, resulting in limited land available in the region for urban uses such as commercial, residential or industrial development.

Greater than 90 percent of all public lands in the CNF were acquired under the provisions of the Weeks Law of 1911. Approximately half of the land within the 1,550-mile-long proclamation boundary of the Forest is privately owned. Other lands within the CNF are administered by State or local agencies, including TVA, TDOT, the Tennessee Wildlife Resources Agency (TWRA), and TDEC.

Most industrial development in the region has occurred in Bradley County, primarily around Cleveland. A limited amount of Polk County land has been designated as industrial. This land is in the vicinity of Copperhill in the southeastern portion of the county. Higher density uses have developed around the incorporated areas of the region. It is in these areas that residential land uses are concentrated. Commercial land uses supporting the resident population also are focused in these areas. Development has been limited in these areas largely due to the absence of utility infrastructure, including water, sewer, and natural gas service lines.

In Polk County, the dominant land use is undeveloped forest and agricultural land. The county is dominated by the CNF. This largely undeveloped area comprises more than 55 percent (approximately 150,000 acres) of the county's total acreage. Other areas designated as forested land include privately-owned woodlands and open space. Other undeveloped areas (exclusive of waterways) include 24,505 acres of agricultural and pasture lands, which make up almost 9 percent of the total county land area.

Development within Polk County has primarily occurred in the incorporated areas and along thoroughfare frontages. It is estimated that less than 2 percent of the county land is comprised of roadways, and less than 1 percent is incorporated or otherwise designated as urban. Residential uses are estimated to comprise less than 1 percent of the county, as are com-

mercial, industrial, and other uses combined. Residential, industrial, and commercial land uses are concentrated almost exclusively in and around Benton and the Ducktown-Copperhill area.

A portion of Polk County has been classified as denuded and partially-vegetated (barren) land. This is land which was defoliated due to systematic industrial use (resource extraction), and is therefore unsuitable in its present condition for agricultural or outdoor recreational use. Barren lands within the county are confined primarily to the Copper Basin area along the southeastern county border. This type of land currently makes up 8,600 acres, or 3 percent of the total county acreage, and is also classified as mining acreage. These lands have been targeted for reclamation in most instances. Reclaimed lands have in the past been utilized for agriculture, timber production, and grazing purposes (Muncy, 1993). Efforts to reclaim barren lands are ongoing. Bowater, BIT Manufacturing, TVA, U.S.D.A. Soil Conservation Service, and private landowners are cooperating to revegetate bare lands.

A.5.b. State and Local Land Use Planning

The Southeast Office of the Local Planning Assistance Office of the Tennessee Department of Economic and Community Development, and the Southeast Tennessee Development District, assist the Polk County Regional Planning Commission and other Polk County agencies with preparation of grant applications and planning documents as budget and staff resources permit. The Polk County Comprehensive Plan, prepared in 1971 and financed by the U.S. Department of Housing and Urban Development, and the Ducktown Sewer Plant Expansion 1993 project application for the U.S. Department of Housing and Urban Development Community Development Block Grant Program, are examples of this support.

Local land use planning is controlled by a number of local agencies in each of the four counties in the ROI. Planning is typically limited to the incorporated areas of the counties due to the large blocks of National Forest lands which preclude the need for such planning. In Bradley County, the Bradley County Regional Planning Commission and Cleveland Municipal Planning Commission implement land development regulations. In Polk County, land development regulations are administered by the Polk County Planning Commission and Copperhill Municipal Planning Commission. In Cherokee County, planning and development

functions are administered by the Cherokee County Planning Department. In Fannin County, planning and development functions are administered by the Fannin County Department of Land Development.

Polk County planning is handled at the county level by the Polk County Regional Planning Commission (PCRPC). The PCRPC has tried to stimulate growth and development in the county by attracting to the region industries which would enhance the economic base of the county and provide an expanded employment base. The PCRPC stated land use goals include the development of industrial parks and, preventing encroachment of incompatible land uses. Commercial expansion along existing road corridors, specifically recreation-oriented activities, is another goal of the Commission. Such commercial uses include "motels, gas stations, gift shops, and boat docks." Residential development is anticipated to be a function of growth in the employment base, which is expected to follow from industrial and commercial growth. Recent efforts have been directed toward the development of a second home/retirement home approach to county growth utilizing the environmental resources of the area.

A.5.c. Site Land Use

Land use proximate to the Olympic Venue site can be characterized by an inventory of land use, identification of property interests and regulations controlling development, existing infrastructure, and structures on public lands within the project area. Natural uses within the project area include forested land, the river, and limited open land. TVA is the property owner of the reservoirs and major portions of the Ocoee River channel and immediately adjacent land. The Olympic Venue site and its vicinity are entirely within the CNF.

The developed environment includes U.S. Highway 64, the adjacent right-of-way, and easements. No utilities serve the site; although a TVA power line corridor is present and other man-made features such as buildings, fences, and other structures are not present at the site. Between U.S. Highway 64 and the river, some areas with grades less than 15 percent occur. The Design Report states that areas with slopes up to 30 percent are considered developable. One notable feature at the project site is the Old Copper Road, which traverses the site along the right bank of the river.

A.6. Public Facilities and Services

Public facilities and services include public safety, utilities and solid waste management, and education services. Existing conditions for each of these services are discussed in this section.

A.6.a. Public Safety

Within the ROI public safety services include law enforcement, fire protection, and emergency medical and health services.

A.6.a.1. Law Enforcement

Law enforcement services are provided by several agencies that have overlapping jurisdictions. Most of the law enforcement agencies in the region have executed memoranda of understanding providing for mutual assistance and response. The Cherokee National Forest and other law enforcement agencies maintain a memorandum of understanding which, in conjunction with the mutual aid policies in effect among the various county and municipal law enforcement departments, makes it possible for law enforcement services in the region to be mutually coordinated should the need arise.

The four counties in the ROI are served by sheriffs' departments. Georgia and Tennessee state police provide services in the region, primarily by patrolling state and federal highways. Municipal police departments serve their respective jurisdictions in many of the incorporated cities. Federal agencies serving the region include the Forest Service law enforcement officers and the Federal Bureau of Investigation (FBI). The Forest Service is primarily responsible for the extensive National Forest lands in the region; the closest local FBI office is in Cleveland. This office is scheduled to be the intelligence center for FBI anti-terrorism activities at the proposed Olympic Venue on the Ocoee River. All intelligence-related information would be transmitted there before being delivered to State, local, and other Federal agencies maintaining security operations at the site. FBI also has a field office in Chattanooga and a regional office in Knoxville. TVA also provides law enforcement services on TVA lands through its Public Safety Unit personnel.

CNF and TDEC law enforcement officers patrol the recreation areas along U.S. Highway 64. TVA employs Public Safety Unit officers. The Tennessee Wildlife Resource Agency also provides wildlife officers with law enforcement authority. The Tennessee Highway Patrol deploys six officers and vehicles in Bradley

County and two in Polk County. The North Carolina Highway Patrol deploys nine officers and vehicles in Cherokee County, and the Georgia Highway Patrol deploys 12 officers and vehicles in Fannin County.

Additionally, the Tennessee Bureau of Investigation (TBI) provides 10 field agents to investigate serious criminal activities in the TBI East Division. The East Division includes Polk and Bradley Counties.

The Polk County Sheriff's Department maintains one station in Benton to serve the western part of the county outside the National Forest, and another in Ducktown to serve the Copper Hill and Ducktown area. Law enforcement is also provided for the county's municipalities by the Sheriff's Department.

The Bradley County Sheriff's Department serves the unincorporated areas of the county from department headquarters located in downtown Cleveland. The City of Cleveland also has a municipal Police Department.

Cherokee County law enforcement services are provided by the Sheriff's Department, headquartered in Murphy. The City of Murphy also has a Police Department.

Fannin County law enforcement services are provided by the County Sheriff's Department, headquartered in Blue Ridge. Municipal law enforcement is provided by the Blue Ridge Police Department.

A.6.a.2. Fire Protection

A Mutual Aid Association of 25 fire departments in the three-state area provides the capability to call in equipment and personnel for fire and emergency response. A dispatching office in Chattanooga coordinates the association's activities in the event that supplementary response services are necessary.

Polk County fire protection is provided by two volunteer county fire departments and two municipal fire departments in Ducktown and Copperhill. The East Polk County Fire Department (EPCFD) serves the county area east of the CNF. The West Polk County Fire Department (WPCFD) maintains two stations, the Benton Station and the Ocoee Station. The Ocoee Station is the closest facility to the site, located approximately five miles from the River.

Outside of the two municipalities, the county fire departments act as first-response units within Polk County. The EPCFD has

mutual aid agreements with the Fannin County, Ducktown, McCaysville, and Copperhill fire departments. The WPCFD has mutual aid agreements with the Calhoun, Charlestown, Cleveland, and Etowah fire departments.

The City of Cleveland Fire Department serves most of Bradley County. Fire protection in the Charleston area of the county is provided by McMinn County. The Cleveland Fire Department has three fire stations. The main station is in downtown Cleveland. The second station is located on the north side of the city at 2800 Key Street. The third station is located on Deathrow Parkway, and is the most accessible of Cleveland's fire department stations to the Ocoee River. Special capabilities include a hazardous materials response team, a first-response team, and a dive team.

All Cherokee County Fire Department personnel are volunteers. The rescue squads maintain equipment for mountain rescue, aquatic rescue, and difficult rescues. The fire station closest to the proposed Olympic site is the Wolf Creek station in North Carolina.

The Forest Service has wildland fire fighting resources at three locations in close proximity to the Ocoee River: Tellico Plains, Etowah, and Ocoee. These resources include 15 firefighters and a 150 gallon engine in Tellico Plains, 14 fire fighters, a John Deere 450 dozer plow unit and a 150 gallon engine in Etowah, and 13 fire fighters and a 150 gallon engine at Ocoee (Corban, 1993).

The Forest Service is neither equipped nor trained to conduct rescue work or to fight structural fires (Corban, 1993).

A.6.a.3. Emergency Medical and Health Services

Emergency medical services for the ROI are coordinated with area fire and rescue units. The emergency facilities at Bradley Memorial Hospital in Cleveland are the second largest in the tri-state area. Erlanger Hospital in Chattanooga is the largest, and is the primary provider of emergency helicopter service to the region (17-minute response time to the proposed site). Northside Hospital in Atlanta and the University of Tennessee Medical Center in Knoxville provide helicopter support for Erlanger Hospital, responding to an emergency at the site within 23 minutes. The Tennessee Army National Guard unit at Lovell Field, Chattanooga, also has medical evacuation capability utilizing specially configured Blackhawk helicopters.

Regional medical services are provided by Bradley Memorial Hospital, with 251 beds and a staff of 130 physicians. The hospital service area includes all of the ROI; Polk and Bradley Counties in Tennessee, Fannin County in Georgia, and Cherokee County in North Carolina. Bradley Memorial Hospital has a \$20 million construction project planned to include a three-story parking facility and a medical mall, to improve provision of medical services. This project would not affect the hospital's ability to accept and treat patients by 1996.

The Copper Basin Medical Center has 44 beds and four physicians on staff. The service area of the hospital includes the area along U.S. Highway 64 from TVA Power House No. 1 through Ducktown and Copper Hill to McCaysville, and continuing along the U.S. Highway 64 corridor 14 miles into North Carolina. The medical center is located about 5 miles from the proposed site of the Olympic Venue. Outpatient emergency services demand peaks in the summer due to the higher number of visitors to the region. The existing facilities are characterized as adequate to meet current demand for medical services.

Lee College, located in Cleveland, maintains a small medical facility. Two registered nurses are on staff, and a physician is on call. The physician is not a staff member of any local hospital; rather, he maintains a private practice. The facility has two examination rooms, used for out-patient care only. The facility has no beds (Smith, 1993). The Tennessee Army National Guard has mobile field hospital units that may be called upon during the Olympics.

A.6.b. Public Utilities

Potable water, wastewater collection and treatment, solid waste management, and electric power are all provided within the ROI. The following discusses each of these utility systems as they relate to the proposed Olympic site.

A.6.b.1. Potable Water Supply

Potable water demands in the ROI are served by several local and regional water suppliers, and by individual well systems. Although the site would have its own water supply, it is important to discuss all utility systems in the ROI. The regional surface and groundwater water supply sources are characterized as sufficient to serve current needs and projected growth.

The incorporated area of the City of Benton is supplied by the Benton Water Works.

Benton Water Works has one well with a rated pumping capacity of 900 gallons per minute (gpm) and one 150,000-gallon elevated storage tank. The utility currently has plans to build an additional storage tank with 200,000 gallons of capacity. Current demand by the 800 metered customers averages about 200,000 gallons per day. There are eight other water systems in Polk County, consisting of 2,500 connections with a total rated supply capacity of 1.57 million gallons per day (mgd). The Ducktown/Copper Hill area is served by the largest of these systems (Hill, 1993).

The Ocoee Utility District serves parts of Bradley County and Polk County outside Benton and Ducktown/Copper Hill. The three supply wells are rated at 650 gpm, 550 gpm, and 500 gpm. These wells pump on demand and are equipped with chlorinators. Approximately 2,700 customers are served by the Ocoee system, 1,800 of which are in Bradley County. Average monthly demand is approximately 19 million gallons (Lane, 1993).

Cleveland Utilities provides water service to all of the City of Cleveland and portions of unincorporated Bradley County. The utility's water supply source is surface water and wells. A filtration plant treats 7.0 mgd from the Hiwassee River, the 1.2 mgd is pumped from the Waterville Spring, and the water use district at Hiwassee can supply up to 3.4 mgd from several wells. Total daily pumping capacity is 11.6 mgd. Additionally, storage capacity of 11.5 million gallons is provided by eight above-ground storage tanks. Current average daily demand for Cleveland is 9 million gallons. The peak daily demand is 10.5 million gallons. Average daily demand is reported to be increasing at a rate of 4 to 5 percent per year. There are currently about 21,000 residential, commercial, and industrial customers served by Cleveland Utilities (Murphy, 1993).

Potable water demand in the other unincorporated portions of Bradley County are served primarily through the use of private wells. Other water suppliers in the county are the Cleveland Utility District, the City of Charleston, and the Ocoee Utility District. Charleston serves only the area within its corporate boundaries. Ocoee serves all areas east of Minnis Road. The upper Ocoee River is not served by any potable water purveyor at the present time. All water demands would be satisfied through private sources such as wells (Lane, 1993).

The City of Murphy municipal water system draws its supply from the Hiwassee River. The city has a maximum daily capacity of two million gallons with a peak load requirement of 800,000 gallons per day. Total storage capacity is 750,000 gallons (North Carolina Community Profile, 1992a).

A.6.b.2. Wastewater Collection and Treatment

Wastewater collection and treatment in the ROI is provided by several local and regional systems, package treatment plants, and individual septic systems.

Wastewater collected by the City of Benton system is processed through a constructed wetland system based on TVA design which became operational in the early portion of 1993. The effluent from the wastewater system is discharged into a manmade pond/wetland. This treatment process can handle about 50,000 gpd at present (Hill, 1992). The wetland system could be expanded to process an additional 50,000 gallons per day.

The Ducktown wastewater system is a Clow extended aeration package built in 1984 which has a treatment capacity of 0.05 mgd. This facility is scheduled to be expanded to a capacity of .14 mgd by April 1995. All systems within the City of Ducktown would be connected to this expanded facility. The expanded facility should have adequate capacity to provide treatment for the wastewater generated by the proposed Olympic Venue.

The City of Copperhill is served by the Copperhill Wastewater Treatment Plant. This facility has a licensed capacity of 400,000 gpd with no deficiencies according to state inspection. There are no plans to expand this facility. The peak use of the facility is January (415,000 gpd January 1992) with lowest use in June, July and August (251,000 gpd in July 1993). The available capacity during the Olympic Venue should approximate summer utilization rates.

The unincorporated portions of Polk County are not served by public wastewater systems, except for a very few residences and a grocery store linked to the City of Benton system. The Ocoee Utility District has planned to extend proposed lines along the U.S. Highway 64 corridor in the near future, although a construction date has not been established (Southeast Tennessee Development District, 1993).

The Cleveland wastewater collection and treatment system serves only the area within the

city limits. Segments of the collection system are now 70 years old. New sewer line construction since 1970 has been used of ductile iron piping, whereas lines placed prior to 1970 used clay and concrete pipes. The wastewater treatment facility has a capacity of 9.2 mgd, and the effluent is discharged into the Hiwassee River. Average and peak daily demand are 7.9 and 9.2 mgd, respectively. The present Intermittent Cycle Extended Aeration System treatment facility was designed to handle up to four times its design capacity for short periods of time (Murphy, 1992).

There is no wastewater collection system and treatment facility serving the upper and lower Ocoee River. Portable toilets and/or private septic systems serve the recreational users of the Ocoee River. Both the Forest Service and Tennessee Department of Environment and Conservation operate public pump and haul toilet facilities along U.S. Highway 64. These units are located at the put-in and take-out areas on the whitewater section of the Ocoee River. Public restrooms are also located at the Forest Service recreation sites at Thunder Rock, Greasy Creek, MacPoint day use area, and Parksville Beach day use area.

A.6.b.3. Waste Management

Solid waste collection in Polk County is handled by private contractors. Residential and commercial generators are served by collection sites located throughout the county. Waste is then hauled by collectors to the McMinn County Landfill. The landfill has a permitted capacity projected through 1998, when federal statute requires that all landfills be properly lined to eliminate the possibility of long-term soil and groundwater contamination. All solid wastes generated along the lower Ocoee River are also collected by private haulers and transported to the McMinn County Landfill for disposal. No trash collection service is currently provided for the upper Ocoee River (McMillan, 1993).

Solid waste collected in Bradley County is disposed at a 110-acre landfill owned by the county. The landfill is operated by a private waste management firm, and has less than 1 year of permitted disposal capacity remaining. The county is currently in the process of permitting an additional 60 acres of land adjacent to the current site for landfill expansion. The expansion would add an estimated 10 years of disposal capacity to the landfill. Various companies provide solid waste collection services in the county (Halloway, 1993).

Solid waste collection services in Cherokee County are provided by contractors. Waste is collected and transported to the Cherokee County Landfill for disposal. The landfill is located on a 17-acre site, and is permitted through 1998, when it must meet proper lining requirements or be closed. It is also expected that by 1998 the landfill will also serve Graham and Clay Counties. The landfill disposal rate is currently estimated at 50 tons of waste per day, 6 days per week (Allen, R., 1993).

Fannin County currently uses a 55-acre landfill site for solid waste disposal. The site has been permitted for use of 15 acres of the property. The landfill disposal rate is currently estimated at 35 tons of waste per day, 6 days per week, and operates 308 days per year. Waste is collected by a private contractor for transport to the landfill (Young, 1993).

A.6.b.4. Electric Power

Electric power supply in Polk County is served by two delivery point substations. These include the Benton station with a capacity of 150 kilowatt hours (kWh) and a peak hourly demand of 85 kW, and the Ocoee station with a capacity of 150 kWh and a peak hourly demand of 165 kW. The Ocoee substation is currently overloaded. A new delivery-point station is being built in southern Bradley County to relieve some of the demand on Ocoee substation system.

Bradley County electric power supply is served by four delivery point substations. These stations include Charleston with a capacity of 150 kWh and a peak hourly demand of 85 kW, Tasso with a capacity of 120 kWh and a peak hourly demand of 95 kW, McDonald with a capacity of 150 kWh and a peak hourly demand of 60 kW, and Hopewell with a capacity of 240 kWh and a peak hourly demand of 120 kW. The City of Cleveland is supplied by TVA. Existing needs are adequately met and future needs are not anticipated to exceed current electrical capacity. Two delivery-point substations serve the city. The east substation has a capacity of 2,000 kWh, and the southwest substation has a capacity of 1,800 kWh. Current peak demand system-wide is 1,880 kWh (Daniels, 1992).

A.6.c. Education

Polk County schools are the only schools in the region anticipated to be affected to any appreciable degree by development of the proposed Olympic Venue on the Ocoee River. The

county provides all of the necessary facilities for elementary and secondary education as prescribed by state law. County expenditures for education exceeded \$7 million dollars during the 1991-92 school year, greater than 50 percent of all county expenditures. The county public school system is separated by the CNF into a western and an eastern district. The county does not have community college, college, or university level facilities. Higher education courses are offered at Lee College and Cleveland Community College in neighboring Bradley County (Cleveland/Bradley Chamber of Commerce, 1992). Cleveland State offers extension classes in Ducktown.

A.7. Recreation

The CNF is comprised of 627,405 acres of land in 10 eastern Tennessee counties, and portions of one county in North Carolina and one county in Virginia. The CNF is divided into six Ranger Districts, one of which is the Ocoee Ranger District, with an office on Lake Ocoee. The Ocoee Ranger District includes the segment of the river proposed as the site of the Olympic events.

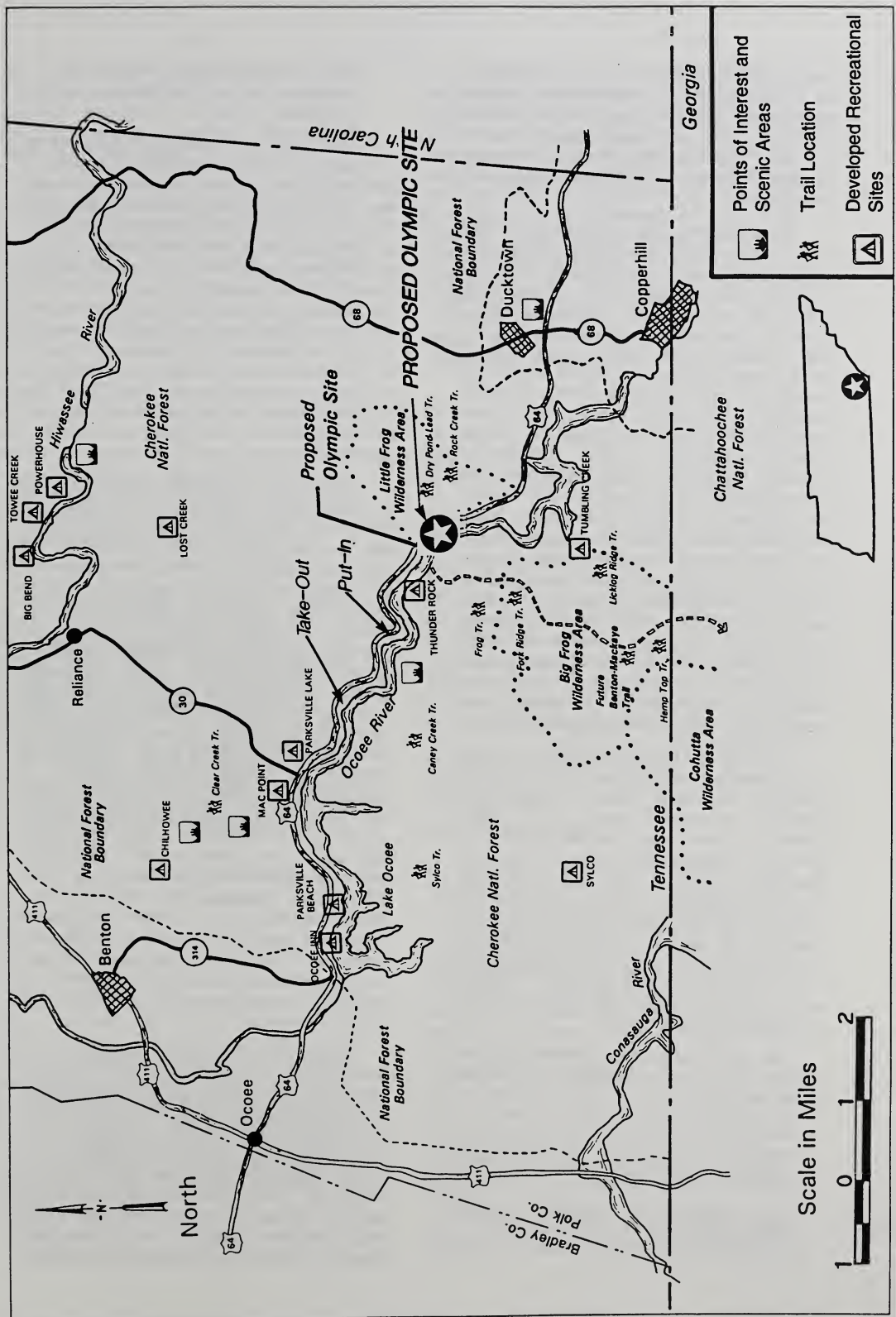
A.7.a. Recreational Opportunities

Recreational opportunities in the CNF are diverse and offer a wide range of experiences including hiking, camping, fishing, hunting, picnicking, canoeing and kayaking, whitewater rafting, and other recreational activities. Recreational opportunities in the vicinity of the proposed site are depicted in Figure III.A.7-1.

The Forest Service has developed a framework for understanding the relationships and interaction of recreation setting and activities. This system, called the Recreational Opportunity Spectrum (ROS), classifies areas into one of six classes or "setting characterizations," including Urban (U), Rural (R), Roaded Natural (RN), Semi-primitive Motorized (SPM), Semi-primitive Non-Motorized (SPNM), and Primitive (P). The ROS provides a framework for stratifying, defining, and managing classes of outdoor recreation environments, activities and experience opportunities (McConnell and Bacon, 1986).

The settings, activities, and opportunities for obtaining experiences have been arranged along a continuum or spectrum and separated into these six ROS classes. Primitive settings include those large, unmodified tracts of natural environment which typically have minimal evidence of human presence. No motor vehicles are allowed in primitive areas of the national

Figure III. A. 7-1
Existing Recreational Facilities



forests. Semi-Primitive Non-Motorized areas are characterized by a predominantly natural environment, and are usually large in size. While the interaction among visitors is often low, there would be some evidence of human presence in this setting. Motorized vehicles are not permitted.

Semi-Primitive Motorized settings also include those fairly large tracts of predominantly natural or natural appearing environment. While the concentration of visitors is low, there would be evidence of human presence. Motorized use is allowed. Roaded Natural settings include those areas which appear natural, but in which evidence of human activity is prevalent. Interaction among visitors is low to moderate. Conventional motorized use is allowed. Rural settings are characterized by a substantially modified natural environment. The native vegetation is usually maintained, but a large number of facilities are provided to meet the demands of a large number of users. Interactions among visitors is moderate to high. Facilities for intense vehicle use and parking are also provided. Urban settings are characterized by an urban development environment that may have a natural setting background. Interactions among visitors are high. Facilities for public use are sized to meet the capacity requirements for large crowds. Transportation facilities include those for privately-owned vehicles as well as mass transit (McConnell and Bacon, 1986).

The CNF has been inventoried to account for the developed and dispersed recreational opportunities available in its land and water base. Developed recreation consists of 29 campgrounds, 36 picnic areas, and 84 other developed sites. Most of these recreation areas are classified in the R and RN categories. Recreational areas along the lower Ocoee River used by rafters and paddlers would also be included in the category. Dispersed recreation consists of all areas which can be classified in the SPM, SPNM, and RN categories. The Big and Little Frog Wildernesses are U-classified recreation areas in the CNF.

The areas associated with the proposed Olympic Venue site are classified by the Forest Service as follows:

- Venue Site - Rural
- Upper River Corridor (upstream from project) - Roaded Natural
- U.S. Highway 64 Corridor - Roaded Natural and Rural

- Big and Little Frog Wildernesses - Primitive and Semi-Primitive Non-Motorized

The supply of recreation is measured in two manners: acres of land designated for recreation and the number of recreation visitor days (RVDs) possible. Developed recreation land accounts for nearly 2,000 acres in the CNF, and 380 acres are in the Ocoee Ranger District. An RVD equals 12 hours (one person for 12 hours or 12 people for 1 hour, or any combination thereof). The maximum possible level of use of the CNF's developed recreation areas is 3,366,880 RVDs per year. However the practical maximum level is estimated at 40 percent of the maximum possible, or 1,346,752 RVDs (USDA, 1986c), due to patterns of use that place peak demand on summer months and on weekends.

Developed recreational opportunities in the Ocoee Ranger District include campsites at Chilhowee, Lake Ocoee, Thunder Rock, Sylco, and Tumbling Creek. Chilhowee contains 88 campsites and 18 picnic units. Activities available include access to whitewater rafting at the Ocoee River, swimming, hiking trails, and fishing. Lake Ocoee contains 41 campsites and is within easy access of whitewater rafting facilities at the Ocoee River. Areas for boating, fishing, and hiking are nearby. Twenty-nine campsites are available at Thunder Rock, which is located near the put-in point for whitewater rafting sports at the Ocoee River. Sylco has 12 campsites and is located in an isolated area. It is accessible for dispersed recreational activities, but no other developed recreation sources are nearby. Tumbling Creek has eight campsites and is also located in an isolated area. Dispersed recreational opportunities are available. Other developed sites in the Ocoee Ranger District include Mac Point, which has a beach area and picnic units; and Parksville Beach, which has a beach area and bathhouse. There is nominal charge for the use of most facilities; however, some are free of charge (USDA, no date).

Dispersed recreational opportunities account for 589,591 acres in the CNF, which includes over 600 miles of trails, several hundred miles of streams, and most of the general forest area (USDA, 1986a). Areas for dispersed recreation can be used for active recreation occurring in underdeveloped areas and for passive recreation. Active recreation includes hiking, rafting, kayaking, swimming and game activities sometimes associated with picnicking. Passive recreation would include those activities

such as viewing scenery, sitting and enjoying the environment, picnicking, and watching other recreators participate in active recreation. Areas for dispersed recreational opportunities include the wildernesses.

Two wildernesses proximate to the Ocoee River and within the Ocoee Ranger District include the Big Frog and Little Frog Wildernesses. The Little Frog Wilderness encompasses 4,800 acres of undeveloped, roadless land. The Little Frog Wilderness is near the upper Ocoee River on the north side of U.S. Highway 64. The Big Frog Wilderness encompasses 8,055 acres of undeveloped, heavily forested, roadless land located approximately 2 miles from the upper Ocoee River site. The area is accessible from the river via the Fork Ridge and Big Frog trails. There are nine major trails which traverse the Ocoee Ranger District. One of these trails, at Sylco, can be used by all-terrain vehicles. The other trails prohibit motorized vehicles. A new trail, the Benton-Mackaye, is proposed for development.

A.7.b. Ocoee River Recreational Use

The rafting industry in the ROI includes approximately 24 whitewater rafting outfitters. These outfitters operate on a seasonal basis ranging from March through September. Because of the seasonal operation and nature of the industry, the opportunities provided by this industry are limited. This industry, as most service industries, has less indirect impact on the local economy due to the low overhead and equipment costs involved. The rafting outfitters do not have extensive staffing requirements and therefore employment opportunities created by this industry are limited.

Peak commercial use of the Ocoee River was estimated at 127,000 for 1991. According to the Cherokee National Forests Customer Final Report, dated November 1991, more than 50 percent of the rafting visitors to the CNF stay less than 24 hours. Of the rafting visitors to the CNF, almost 60 percent lived within a 200 mile radius, less than four hours drive time away from the Ocoee. Therefore, most rafting visitors to the region are day visitors and do not require lodging during their stay. The approximate cost of rafting the Ocoee is \$35 per person for a four hour trip. Visitor demographic files show the average CNF visitor to be Caucasian, within the ages of 15 and 44, employed full time, and earning between \$25,000 and \$49,000.

Recreational use of the Ocoee River has increased substantially in recent years. TDEC reported that there were 143,917 total users of the Ocoee River in 1988. Total users include paying (commercial) customers with guides and guide trainees of the outfitters, and all other users. By 1992, the number of total users of the river increased an estimated 32 percent to 189,796. Table III.A.7-1 shows Ocoee River commercial customers, not including guides and trainers, by month from March through September in 1990, 1991, and 1992, based on Forest Service records. Table III.A.4-5 also indicates Ocoee River total users by year from 1988 through 1992, based on TDEC figures.

The peak month for river use is August, followed by July and then June. Total annual commercial users, including guides and guide trainees of the outfitters, increased from 122,052 reported in 1988 to 167,553 in 1992. This increase is an average of 11,375 commercial users annually. The ratio of non-paying commercial users to commercial customers is about 1 to 5, with non-paying commercial users averaging 21.5 percent of the total paying customers over the last 5 years. The total of all users increased from 143,917 in 1988 to 189,796 in 1992. This increase is an average of 11,470 total users annually. The ratio of noncommercial users to total commercial users is about 1 to 6.3, with noncommercial users averaging 15.9 percent of the total commercial users over the last 5 years. The TDEC has now placed a cap on the total number of commercial users allowed on the river for four peak days to alleviate overcrowding.

A.7.c. Visitor Profile

Surveys of visitors to developed recreational facilities in the CNF reveal characteristics of the visiting populations. The typical visitor to the region is a white male between the age of 25 and 44 years with some college education, earning between \$25,000 and \$49,999 annually. Activities in which the visitors participate include motor boating and fishing, canoeing and kayaking, developed camping, dispersed uses, picnicking, pleasure driving, rafting and swimming, and sunbathing. Ninety percent of the visitors to the CNF whose primary recreational pursuit is motorboating and fishing are repeat visitors. The typical length of stay for this purpose is 5 to 12 hours (Outdoor Recreation and Wilderness Assessment Group, 1991).

Almost 90 percent of the visitors whose primary recreational pursuit is canoeing and

TABLE III.A.7-1
Ocoee River Commercial Customers, Selected Months, and
Annual Reported Totals, Commercial Users and All Users, 1988-1992

	Mar	Apr	May	Jun	Jul	Aug	Sep	Cmcl Total ^(a)	All Users ^(b)
1988	na ^(c)	na	na	na	na	na	na	122,052	143,917
1989	na	na	na	na	na	na	na	122,876	141,816
1990	na	687	5,557	16,970	29,159	29,845	16,068	130,044	153,415
1991	194	1,769	6,724	19,139	31,584	41,112	16,683	148,973	171,206
1992	192	1,858	8,729	19,095	37,657	47,015	15,732	167,553	189,796

^a Paying customers, guides, and guide trainees (commercial users).

^b Commercial users and all others.

^c Not available.

Sources: U.S. Forest Service

Tennessee Department of Environment and Conservation.

kayaking are repeat visitors. About 40 percent of the total visitors for this purpose are in groups, either family or friends. The typical length of stay for this purpose is either 5 to 12 hours, or 1 to 2 days. Seventy-five percent of visitors that indicated camping as their primary reason for visiting the forest are repeat visitors. Most campers stayed for 1 to 2 days. The majority of persons traveling to the Forest for dispersed uses were repeat visitors; however, visiting the CNF for this purpose also includes the largest number of new visitors. The length of stay is typically 3 to 7 days (Outdoor Recreation and Wilderness Assessment Group, 1991).

Over 80 percent of picnickers were repeat visitors and typically stayed between 5 and 12 hours. Those who indicated that pleasure driving was the primary reason for traveling to the park also included a large number of first-time visitors. The length of stay was brief, between 2 and 4 hours. Swimming and sunbathing is also a popular category for repeat visitors in large parties of seven or more persons. Most of these visitors stay 12 hours or less (Outdoor Recreation and Wilderness Assessment Group, 1991).

The majority of rafters are also repeat visitors. Visitors to the forest for this purpose included many groups. The most common group size is between three and six persons, followed by groups of seven to 20 persons. Thirty-one percent of the visitors stayed 5 to 12 hours, while an equal number of visitors stayed 1 to 2 days (Outdoor Recreation and Wilderness Assessment Group, 1991).

The *Ocoee River User Study* assessed the carrying capacity of the river to support recreational use (University of Tennessee, Clemson University, 1989). The study focused on the stretch of the river between the Rodgers Branch put-in point and the take-out area at Caney Creek. About 75 percent of the river users surveyed were customers of commercial outfitters. The outfitters provide equipment rentals, whitewater recreation training, and guides for rafting. The other river users identified themselves as more experienced and required no assistance from the outfitters, although some did rent equipment. Most of the users indicated their recreational experience on the Ocoee River was excellent, but many of the respondents also indicated that they perceived the river as too crowded. Users who were not outfitter customers and described themselves as experienced with whitewater recreation were more likely to identify crowding as a problem, citing the num-

ber of rafts on the river, collisions between rafts, and slowdowns at certain rapids as diminishing the quality of their experience (University of Tennessee, Clemson University, 1989).

The results of the survey conducted for the *Ocoee River User Study* are similar to the survey of CNF users. The survey indicates that the typical river user is young adult to middle age, well-educated, and has a moderate to middle income level. Over 50 percent of the survey respondents were first-time visitors to the river. Daily use levels during the 30-day survey period in 1988 ranged from 437 to 4,766 visitors. The peak daily use level, defined as an average of the five highest daily counts, was 4,242 in 1988. That figure was an estimated increase of 4.4 percent over the 1987 peak daily use level. Total river use in 1988 was estimated at 140,190, an increase of more than 6.5 percent from 1987. The 1992 estimate of total users was 188,976. Peak day use in 1992 was estimated to be 5,600 (University of Tennessee, Clemson University, 1989).

A.7.d. Visitor Expenditures

The Mountain Outdoor Recreation Alliance (MORA) and TVA surveyed recreationists at the Nantahala and Ocoee Rivers respectively in order to estimate average daily visitor expenditures. Several of the outfitters in the ROI provide rental equipment and guides on both rivers. Estimates of expenditures are divided into several categories including lodging; transportation; food and beverages; equipment rental, supplies and admission fees; and miscellaneous expenses.

The MORA survey reports a total daily expenditure of \$77.66 per person on a typical whitewater rafting trip. Other daily expenses include \$13.62 per person for equipment rental, supplies and admission fees, \$12.95 per person for transportation, and \$14.87 for all other expenses.

The TVA survey reports a total daily expenditure of \$145.17 per person on a typical rafting trip. The largest daily expense indicated in this survey is equipment rental, supplies and admission fees of \$31.45 per person per day. Other daily expenses include \$18.96 per person for lodging, \$5.66 for commercial transportation and about \$14.00 for miscellaneous expenses.

Neither survey is a reliable source for estimating the typical spending patterns of a whitewater recreationist. The MORA study significantly underestimated the total cost of

equipment rental and admission fees, thus underestimating the total daily expenditure by nearly 20 percent. The TVA study included many expenditures that would have accrued at the beginning of the trip at the origin point such as expenses for car maintenance or other modes of travel to the site. These expenditures would not result in economic benefits realized within the ROI. Additionally, the study neglected to include the expenditures for student groups from schools and churches which typically spend considerably less than the well-educated, upper middle income male, the population component toward which the TVA survey is biased. It should be noted that the TVA study was not completed as originally intended and members of the survey team admit the results are skewed towards those recreationists which would likely spend more than the average.

The best estimate of visitor expenditures would likely be a midpoint in the range between the two estimates. Based on the results of the two surveys, the following visitor expenses have been estimated: equipment rental, supplies and admission fees, \$27 per person per day; lodging, \$19.00 per person per day; expenses for meals, ground transportation while in the forest and miscellaneous expenses varied depending on the length of stay. Of the total commercial visitors to the Ocoee River, 70 percent are estimated to stay in the forest during the day only. No lodging expenses would be incurred by these individuals. The total daily expense is estimated to be \$58 per person which includes expenditures for ground transportation, meals and miscellaneous expenses as well as the cost of rafting on the river. About 15 percent of the total commercial visitors are estimated to stay in the forest overnight and raft two days. The total expense is estimated to be \$132 per person, which includes all the expenses mentioned above. The remaining 15 percent is estimated to raft three days and stay overnight two days. The total expense is estimated to be \$205 per person, which includes all the expenses mentioned above. A weighted average of these visitor groups yields the average visitor expenditure per trip of \$91.

Based on these estimates of visitor expenditures and the record of total commercial visitors in 1991 as shown in Table III.A.7-1, the total direct economic effect of whitewater rafting on the Ocoee River was \$4.7 million and the total induced economic effect of whitewater rafting on the Ocoee River was \$4.6 million. The total sales volume exceeded \$9.3 million, yielding an employment effect of 80 jobs. Total

government expenditures in 1991 directly related to the recreational activities on the Ocoee River are estimated to be \$85,000; revenues are estimated to be \$111,000. The net gain is estimated to be \$27,000.

A.7.e. Other Recreation Opportunities

Other sources of developed recreational opportunities in the area include the Sugar Loaf Campground in Ocoee, Tennessee, which has 30 campsites for whitewater rafters, and two private campsites near Cleveland, Tennessee. These include the Cleveland Kampground of America (KOA), which maintains 70 campsites, and the Exit 33 Campground near I-75, which has 26 campsites.

A.8. Visual Resources

Visual resources in the CNF associated with the proposed Olympic Venue are analyzed using procedures from the Forest Service's Visual Management System (VMS). The Forest Service applies the VMS to all land management decisions and activities, such as road construction, timber harvesting, recreational facilities and structures. Visual or scenic resources are generally considered to be composed of the basic elements of form, line, color and texture. Changes to these elements can be analyzed through application of the VMS. Specific criteria for identification and classification of visual resources, their character type, sensitivity level, and Visual Quality Objectives (VQO) are described in the National Forest Landscape Management - Volume 2.

This VMS provides a common method to categorize all lands under Forest Service management. The FLRMP for the CNF identifies the VQOs for all areas in this 627,405-acre forest. It provides for an inventory and classification of the visual resources of the site locale prior to consideration of the proposed Olympic Venue.

A.8.a. Existing Regional Setting and Visual Character

The project site for the proposed Olympic Venue offers a spectacular natural setting in a beautiful corridor of the CNF along the Ocoee River. The steep rugged topography, forest vegetation, rock outcroppings, and Ocoee River create a naturally beautiful area. Existing man-made modifications affecting the visual quality of the area surrounding the project site include U.S. Highway 64, TVA's diversion of the Ocoee River, electric power lines, and the historically significant Old Copper Road.

U.S. Highway 64 follows the valley above the river, creating a maintained thoroughfare corridor ranging from about 100 to 200 feet wide, with two to four lanes of highway pavement. Non-indigenous rock fill materials have been placed directly along the river as embankment on the edge of the highway. Parts of the project site have been used for site and construction staging areas by TDOT. The highway has the most significant visual effect on the natural setting of the site.

TVA's diversion of the Ocoee River has resulted in two types of visual features in the area. Physical structures such as the dams, aqueducts, power houses, and supporting facilities affect the viewshed. Almost as important visually is TVA's diversion of water from the river. At minimal flow periods, the lack of water in the channel has a significant effect on the visual resources of the area.

A.8.b. Project Viewshed

The "viewshed" of the project is defined as those locations having views of the proposed action effects (facilities and/or land modifications) on the project site. The viewshed of the Olympic Venue on the Ocoee River covers nearly 527 acres, extending well beyond the immediate vicinity, as shown on Figure III.A.8-1.

A.8.c. Visual Variety Classification

The Forest Service's VMS process classifies the natural features of an area as distinctive, common or minimal variety. Natural landscape features inventoried are landform, rockform, vegetation, and waterform. This process determines what landscapes are most important and those that are of lesser value from the standpoint of scenic quality. This process also clearly identifies those features most important to the make up of areas visual quality.

The landform of the area around the project site is "distinctive," known for its hilly to mountainous topography with slopes ranging from 1 to 60 percent. Many of these slopes are dissected, meaning they are cut deeply into lobes. Rockform features in the area are distinctive in their visual character and have significant effect on the scenic qualities for which the region is known. Therefore the boulders and rock outcrops on the site, especially near the Ocoee River, are considered an outstanding individual feature. Vegetation primarily consists of mixed coniferous and hardwood forest, which is "common" to the area. The primary waterform in the viewshed is the Ocoee River,

which is the primary drainage system in the area. While the river often has low water levels, it can exhibit unique fast-flow characteristics across rapids in the area of the project site during storm events or release of water by TVA, making it quite "distinctive." When the river is dry throughout much of the year, the whitewater flow of the water, which is the most unique feature and visual resource of the project area, is absent.

A.8.d. Visual Quality Objectives

Visual quality objective classifications have been assigned by the Forest Service to all CNF lands. The visual quality objective of an area is keyed to the values established for the diversity of natural landscape features (Variety Class) and the public's concern level for scenic quality (Sensitivity Level). The five categories below were designed to set measurable standards, or objectives, for the visual management of the land.

P	Presentation
R	Retention
PR	Partial Retention
M	Modification
MM	Maximum Modification

Other than "Preservation," each of these generally describes the different degree of acceptable alteration of the natural landscape based upon the importance of aesthetics. The degree of alteration is measured in terms of visual contrast with the surrounding natural landscape.

The Forest Service's VMS mapping of this resource identifies three categories in the project area which are shown in Figure III.A.8-2 and summarized below. All of the areas visible from the roadway and river are categorized as follows:

Distance Zone:	FG (Foreground)
Sensitivity Level:	1 (Highest Sensitivity)
Variety Class:	B (Common)
Quality Objective:	R (Retention)

Areas with a VQO of "retention" direct management of the lands through activities and development which are not visually evident. Upper elevation areas that are generally outside the viewshed of the project site are classified as follows:

Distance Zone:	MG (Middle-ground)
Sensitivity Level:	1 (Highest Sensitivity)

Figure III. A. 8-1
Olympic Venue Viewshed

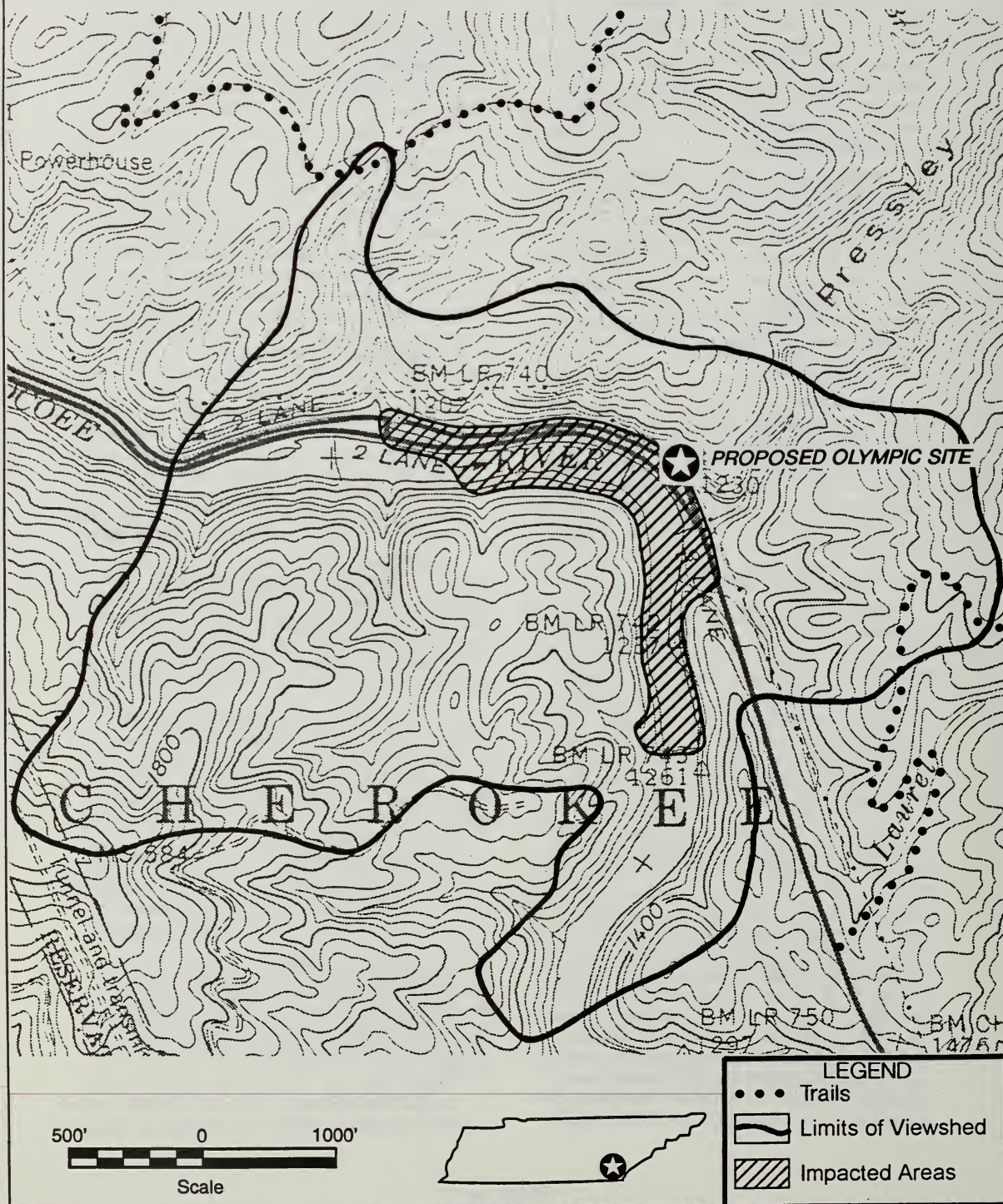
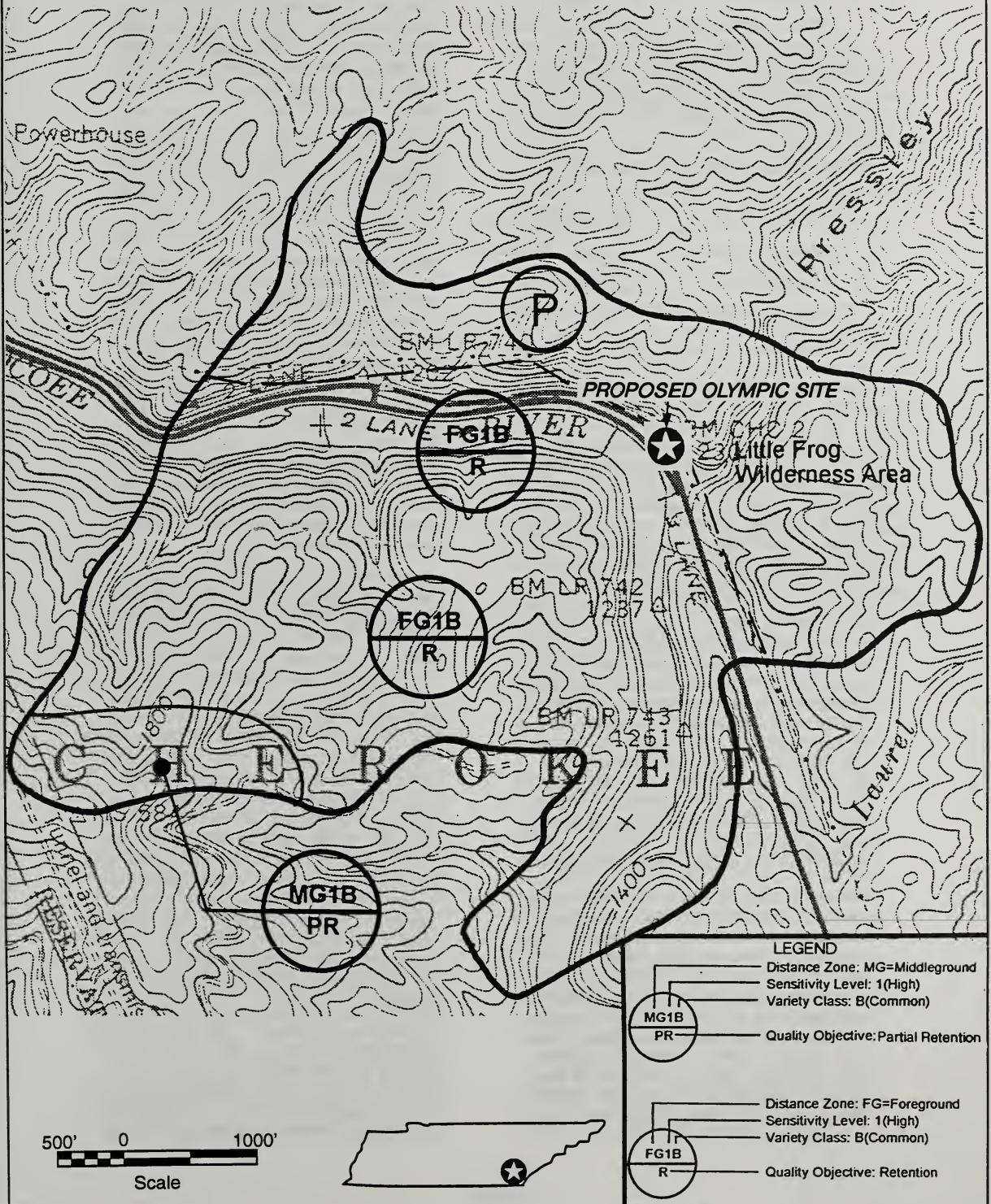


Figure III. A. 8-2
Visual Quality Objectives



Variety Class: B (Common)
 Quality Objective: PR (Partial Retention)

Areas with a VQO of "Partial Retention" direct that management activities and development should remain visually subordinate to the characteristic landscape. Forest VQOs are illustrated in Figure III.A.8-2.

The Little Frog Wilderness Area, north of the project site is classified as follows:

Distance Zone: MG (Middle-ground)
 Sensitivity Level: I (Highest Sensitivity)
 Variety Class: A (Distinctive)
 Quality Objective: P (Preservation)

A.8.e. Visual Context

The visual context is defined herein as the basis from which the environmental consequences of the proposed action would be analyzed. A primary variable in determining effects of an action on visual resources is the viewer's location in relationship to the proposed project site. The visual environment was analyzed from three locations, U.S. Highway 64, the Ocoee River corridor and the Little Frog Wilderness. A description of these locations and their existing visual conditions follows.

- U.S. Highway 64 - Views of the project site having the highest visual magnitude (defined here as what is seen most) will continue to be from U.S. Highway 64 (designated a National Scenic Byway). Eastbound traffic can view the project area for approximately 1,000 linear feet along this highway. Traffic data indicate average daily eastbound traffic to be about 2,050 cars per day. Westbound traffic would have to turn and look almost backward to see into the site. Therefore primary views will be from eastbound traffic.

Views from U.S. Highway 64 are along an enclosed corridor type space, which is large scale because of the clearing for the roadway. This provides views of the mountainous rugged topography with tree vegetation. The roadway forms a gentle curving ribbon type line, while the pines in the area form multiple vertical lines. The soft textured green vegetation contrast with the rugged gray to brownish rock and ground colors from spring till fall. In the winter the rugged texture and brown to

gray colors predominate, with the green pines scattered across the mountainous terrain. With the exception being at the project site, views of the river from the highway corridor are often partially screened by the vegetation, which creates a sense of enthusiasm to see the whitewater when there is water flowing.

- Ocoee River Corridor - While the viewer's proximity to the project site from the river corridor is very close, the potential number of viewers (viewer intensity) along the river is very low, consisting primarily of day use visitors to "Blue Hole" and similar areas because currently there are very limited water releases to provide whitewater recreation opportunities in this area. During warmer months of the year, when water is not flowing in the river, there is some day use picnicking and swimming in the holes, particularly "Blue Hole." These visitors are the primary viewers of the project area from the river corridor. However, some of the long-term operational scenarios include regular water releases for whitewater recreational use of the river, similar to those downstream on the Ocoee. This would increase the number of viewers on the river.

Views from the Ocoee River Corridor are smaller in scale than those along the highway corridor because of the close proximity of the trees, which often abut the riverbank and overhang the water. Views of U.S. Highway 64 are limited because the river is so much lower, and the main feature seen is the limestone fill placed near the project site to stabilize the highway. Occasional glimpses of the overall rugged mountain topography lets the viewer sense the overall context of the setting. The strongest impression of the corridor is provided by the water or lack of it in the stream bed. The water and whitewater at the rapids are striking visual statements. Glare from the sun on the water is limited due to the irregular alignment and vegetation. The irregular shoreline and rock-forms create a very rugged texture which is another strong visual impressions of the corridor.

- Little Frog Wilderness - The Little Frog Wilderness, located to the north of the project site and within the project viewshed, is a unique and valuable National Forest resource. While the topography indicates a viewshed into the project site

from this wilderness to be approximately 179 acres, the forest vegetation will screen the proposed facilities from all areas in Big Frog and from the trails within Little Frog. Even with leaves off, there will be no views of the project site from Big Frog Wilderness, because of the topography. There may be limited views along a very short distance of Dry Pond Lead trail. While the number of viewers from the Little Frog Wilderness will be minimal, effects of the proposed action on this unique - visual experience are evaluated in Chapter IV.

Views of the project site from the Little Frog Wilderness would be from areas off the established trails. From this distance the vegetation and tree's trunk massing along with the topography would limit views to glimpses. Generally while in this Wilderness, the natural rugged features of rock, landform and tree trunks are viewed at a very close scale and contrast to the green vegetation forms more of a canopy. The limited views from this Wilderness would be at higher elevations looking out and down, which would almost be a look-over a very broad landscape.

A.9. Geology and Soils

This section presents an overview of geologic characteristics and soil conditions within the region and proximate to the proposed Olympic Venue site.

A.9.a. Geology

The Ocoee River is located in the Blue Ridge Physiographic Province, which is bounded on the west by the Valley and Ridge Province and on the east by the Piedmont Province. The Blue Ridge Province in south-eastern Tennessee can be subdivided longitudinally into three geomorphic belts. These belts are, from west to east, the Chilhowee Mountain belt, the foothills belt, and the mountain belt (King, 1964). The project area lies in the mountain belt, and is underlain by Precambrian rocks of the Great Smoky Group which is a member of the Ocoee Series (Wiener and Mersch, 1992). These rocks have undergone several episodes of deformation and faulting resulting in a structurally complex setting (TDOT, 1990).

The bedrock of the project area is composed of metasedimentary rocks of the Boyd Gap Formation. The major rock types of this formation are laminated slates or phyllites and

metagraywacke (Wiener and Mersch, 1992). The fine-grained slates and phyllites are typically thin-layered and dark grey to black. The fine- to coarse-grained metagraywackes are thinly-bedded to massive and light to dark grey. The Boyd Gap Formation also includes dark grey matrix-rich metagraywackes that are highly sulfidic (TDOT, 1990). The rocks of the Ocoee Series contain sulfide minerals such as pyrite, pyrrhotite, chalcopyrite, sphalerite, and marcasite (Jago, 1989). Sulfide minerals occur throughout the unit, although they are most prevalent in the fine-grained slate and phyllite. "Anakeesta" is a generic term used to describe rocks that have the potential to produce acid drainage. The rock units found in the Ocoee River area may not be correlative to the Anakeesta Formation of Great Smoky Mountains National Park. Of primary importance to this investigation is the mineralogy of the rocks in the project vicinity and their tendency to produce acid drainage upon weathering.

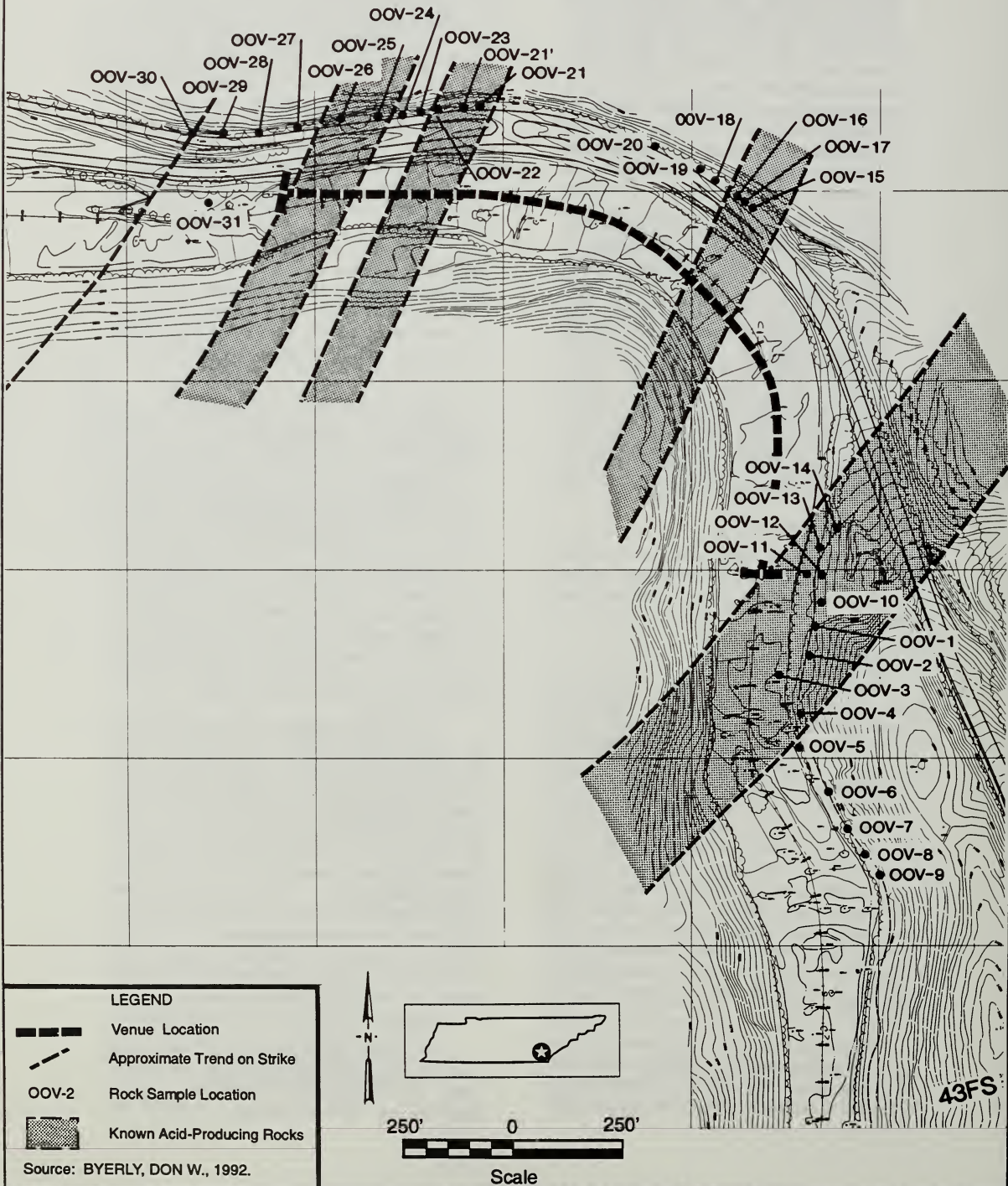
A geotechnical investigation of the Olympic Venue site was conducted in 1992 (Byerly, 1992). Rock samples were collected from the vicinity of the site and analyzed for their potential to produce acid drainage. Known acid-producing rocks were also identified in the project area. These rock units occur in bands striking from north 20° to 40° east. The bands vary in width and generally are associated with fine-grained lithologies. A summary of this investigation and results of the acid/base accounting of the samples collected at the project area is provided in Appendix G-5. Figure III-A.9-1 illustrates the sampling locations and the areas suspected of producing acid drainage.

Field reconnaissance was conducted at the site in November 1992, and in January and April 1993. Pyritic materials and existing acid drainage were identified in most of the road cuts along U.S. Highway 64 near the project area. Pyritic materials were also identified along road cuts on the access road to Ocoee No. 3 Dam. These roads are constructed through layers of acid-producing rock. Williams Creek and Laurel Creek pH levels have been affected by acid runoff from the road cuts on U.S. Highway 64. These creeks are acidic downstream of cut and fill areas. Rock Creek appears to be unaffected by road construction activities in the area. (See also Section A.10.e, Water Quality.)

Lithologic samples were collected from outcrops and from fill material in the project area. The samples were identified as slates, phyllites, and metagraywackes. Many of the

Figure III. A. 9-1

Rock Sample Locations Showing Areas Suspected of Producing Acid Drainage



samples collected contained visible pyrite crystals. Road fill material was identified east of the "Blue Hole" parking area. The potential for this material to produce acid drainage is high, as the fill material probably came from nearby roadcuts known to contain acid-producing minerals.

A.9.a.1. Mineral Resources

The U.S. Geological Survey prepared a minerals inventory for the CNF in 1981, which concluded that commercial deposits of uranium, thorium, niobium, tungsten, beryllium, oil and gas, and mica, are known to occur within the CNF. Of these, the probability of deposits of niobium, tungsten, and beryllium is somewhat likely, although they may not be large enough to warrant mining operations. Except for oil and gas, little or no demand exists for minerals in the CNF (USDA, 1986b). All mineral rights around the project area are owned by the Federal government (Hattersly, 1993).

Precambrian rocks of the Ocoee Series locally contain important metallic mineral deposits, such as copper, gold, zinc, iron, silver and lead. No specific information exists for the project area; however, rocks of the Ocoee Series have the potential to contain these minerals. The project area is also suspected to be in a province of potential natural gas deposits, although the potential for both oil and gas in the CNF has been identified as speculative.

Unconsolidated alluvial deposits of Quaternary age occur locally in the Ocoee River drainage. Commonly occurring mineral resources such as sand, clay, gravel, and stone are subject to Forest Service mining permits and are limited to local use (USDA 1986b).

A.9.b. Soils

The following soil types have been identified within the project area: Cataska Rock Outcrop Complex, Citico Channery Silt Loam, Fletcher Silt Loam, Ranger Channery Silt Loam, Tusquitee Loam, and Quaternary Alluvium. The first five of these soil types have been classified in the Soil Conservation Service (1991) Soils Survey for Polk County. The sixth type, Quaternary Alluvium, is a term used by geologists to denote unconsolidated materials which have been transported and deposited by streams or rivers in recent times. Each of the above-listed soil series is divided into several units. Figure III.A.9-2 depicts each of the soils mapping units in relation to the site. The Forest Service Soil Resource Inventory Report (Scott, 1991) lists properties of each of the mapping

units. The following descriptions are based on reports published by the Soil Conservation Service and the Forest Service.

The Cataska soils series are typically found within major river gorges in mountainous areas. Soils within this series were formed in residuum weathered from phyllite and slate bedrock. These soils are moderately permeable and erodible. Surface runoff is rapid, and the soils have moderate susceptibility to landslides. The two mapping units of this soil series, 12F and 12G, have strongly acidic soils and may therefore contribute to acid drainage. The erosion-hazard property of soils of this series is classified as severe.

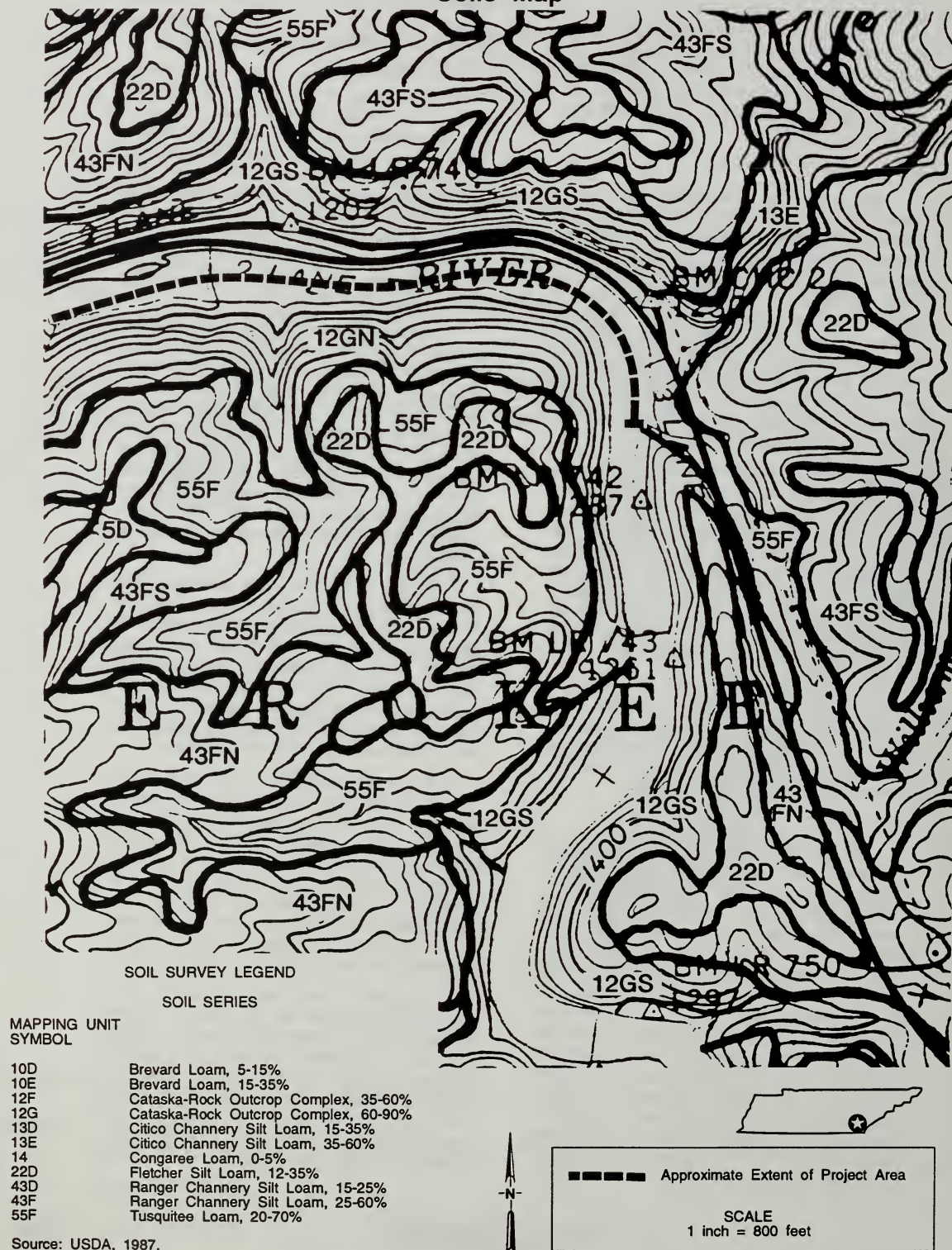
The Citico Channery Silt Loam series is comprised of soils derived from phyllite and slate colluvium and contains numerous rock fragments. The Citico soils are well drained and typically occur on steep lower sections of mountain slopes. These soils are moderately permeable with a moderate erosion potential. Surface runoff is moderate to rapid, with moderate to severe landslide susceptibility. The two mapping units of this series, 13D and 13E, are strongly acidic and may therefore contribute to acid drainage.

Fletcher Silt Loam soils developed from weathered phyllite bedrock. Soils from the Fletcher series are typically found on upper side slopes of mountains and along ridge tops. Fletcher soils are moderately permeable and slightly erodible. Runoff is typically moderate with a slight landslide susceptibility. These soils are strongly to very strongly acidic and may therefore contribute to acid drainage.

Ranger Channery Silt Loam soils developed as a result of the weathering of phyllite bedrock. The soils are well-drained and found on moderately steep to very steep slopes. Surface runoff properties of these soils are classified as moderate. The Ranger soil series is classified as being acidic and therefore may contribute to acid drainage. The two mapping units of this series, 43D and 43F, are moderately permeable and have slight erosion potential.

Tusquitee Loam was developed from acidic gneiss, phyllite, and mica schist. The soil series is found on steep upland slopes. These soils are well-drained, moderately permeable, and have a severe erosion hazard. Surface runoff is typically slow but soils are very susceptible to sliding and erosion. These soils are strongly to very strongly acidic and may therefore contribute to acid drainage.

Soils Map



Quaternary Alluvium consists primarily of sands and gravels transported by running water and deposited in the stream channel or on adjacent floodplains. These deposits are unconsolidated, transient in their distribution and extent, and may become significantly modified over very short time periods.

A.9.b.1. Site Soil Limitations

The majority of the soils found within the project area are at least moderately erodible and are susceptible to landslides. The Cataska soil series occupies approximately 85 percent of the project area, and is classified as having severe erosion potential. These soils are located along the floodplain of the Ocoee River. The Citico soil series occupies approximately 5 percent of the project area. These soils are located along creek bottoms and have moderate erosion potential. The Tusquitee soil series occupies approximately 5 percent of the project area. These soils are found on steep slopes and have severe erosion potential. The remaining soils occupy not more than 5 percent of the project area.

Acid drainage is a potential concern for all of the soil types present at the site with the possible exception of alluvium. Both surface water and groundwater flowing over or through the site soils may, through geochemical processes, become sufficiently acidic to adversely affect the biological or physical environments.

A.10. Hydrology

This section presents a description of existing hydrological conditions including climate, regional watershed, channel stability, water availability, and surface water quality.

A.10.a. Climatic Conditions

The average annual temperature in the Ocoee River area is 56.9 degrees Fahrenheit (°F), with January usually being the coldest month (normal 36.3°F) and July the hottest (75.5°F). The Ocoee River area averages about 59 inches of precipitation annually, distributed fairly evenly throughout the year. March is usually the wettest month (6.28 inches), and October is the driest (3.67 inches) (Owenby and Ezell, 1992). Because of the remote location of the proposed Olympic site on the Ocoee River, accurate data on temperature and precipitation extremes are not available. Interpolating generalized climatic maps with accuracy is difficult, since sharp changes may occur in short distances, particularly in mountainous areas such as the site area, due to differences in alti-

tude, slope of land, type of soil, vegetative cover, bodies of water and air drainage. The State Climatic Division in which the site area is located receives a mean annual precipitation of 839 millions of gallons of water per square mile. The mean number of days with 0.01 inch or more of precipitation is over 100 per year. Mean annual humidity is 70 percent. Mean annual lake evaporation is 35 inches. The mean annual percentage of possible sunshine is 50-55, which increases to approximately 60 percent in the summer months. Prevailing winds in the general area of Tennessee are predominantly from a southwesterly direction at 7 mph (U.S. Dept. of Commerce, 1968).

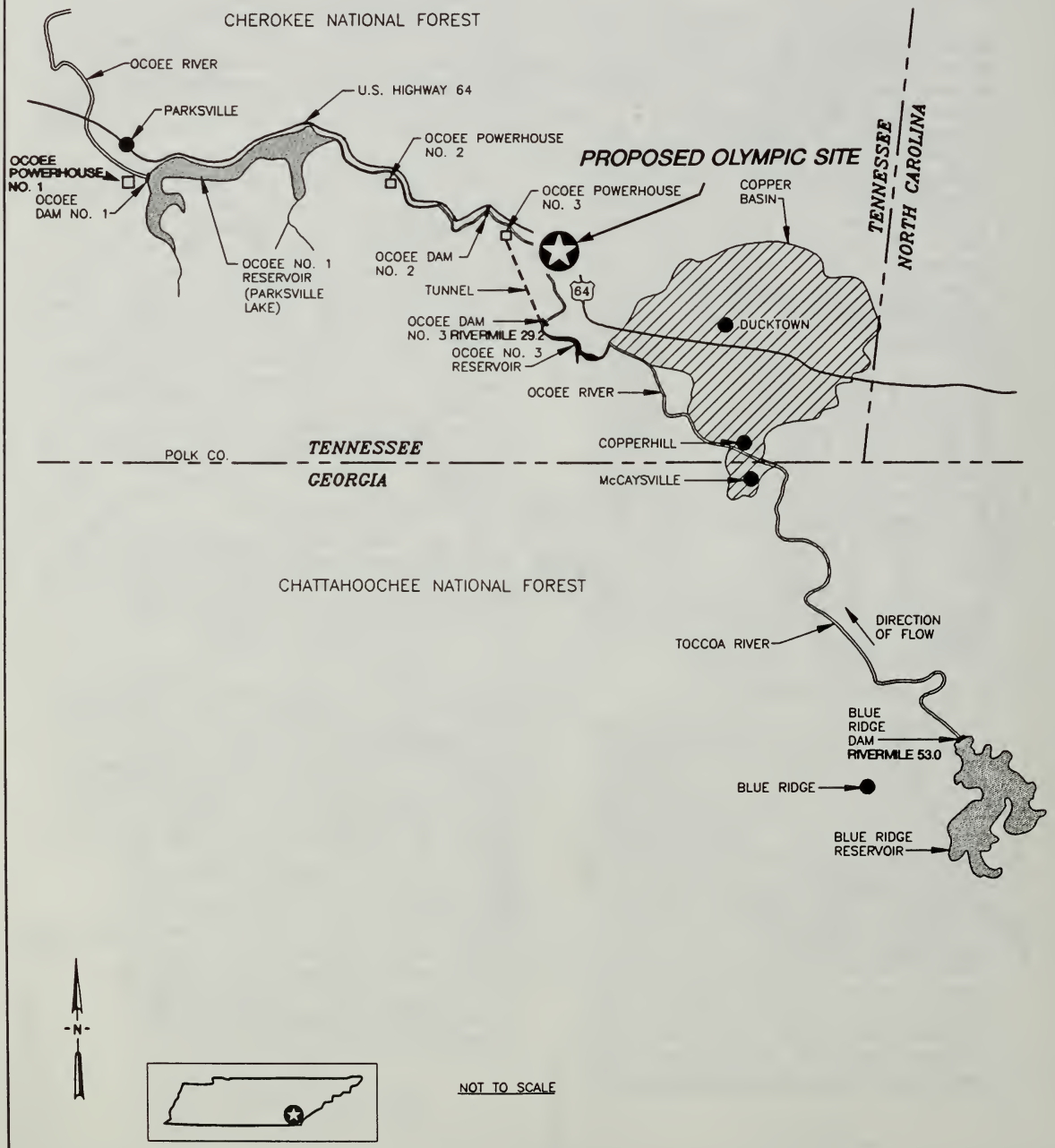
Streamflow varies seasonally with rainfall, although during the spring and summer, evapotranspiration somewhat reduces the amount of run-off. Watersheds that receive 50 to 60 inches of precipitation annually average about 20 to 30 inches of run-off (Dycus and Meinert, 1992). A larger amount of run-off occurs during the wet winter and spring months when precipitation events are frequent, temperatures are low, and there are no leaves on deciduous vegetation. Consequently, soil absorption, evaporation, and transpiration losses are low at that time of year, and both run-off and streamflow are higher than during the summer and fall months.

A.10.b. Watershed Description

The proposed competitive channel zone of the Ocoee River is located 2.5 river miles below TVA Dam No. 3, between river miles 26.2 and 26.8. The Ocoee River area, including reservoirs and dams as well as local towns and features, is depicted in Figure III.A.10-1.

The area surrounding the site is mountainous and forested, with rock outcroppings. The site is immediately adjacent to a four-lane divided segment of U.S. Highway 64, which is winding and mostly two-laned through most portions of the Ocoee Gorge. The majority of the watershed is comprised of forested land within the Chattahoochee and Cherokee National Forests. The Copper Basin, a larger eroded region located southeast of the site, has been denuded by past mining and mineral processing activities. Approximately 8,600 acres, or one-third of the originally denuded area, remains in need of reclamation (TVA, 1986 and 1991; Muncy, 1993). Sediment from the Copper Basin is deposited within the Ocoee watershed.

Figure III. A. 10-1
Surface Water Resources



The Ocoee River, known as the Toccoa River until it crosses the Georgia-Tennessee state line, originates in the north Georgia mountains. The TVA controls the river and maintains the Blue Ridge Reservoir upstream in Georgia as well as the Ocoee complex of dams and reservoirs. Downstream from the Tennessee state line, the river is impounded to form Ocoee No. 3 Reservoir. Here most of the water is diverted into a tunnel down to the Ocoee No. 3 Powerhouse. Below Ocoee No. 3 Powerhouse is Ocoee No. 2 Dam, where water is diverted through a wooden flume to Ocoee No. 2 Powerhouse. Ocoee No. 1 Dam, located about eight miles below Ocoee No. 2 Powerhouse, confluent with the Hiwassee River about 12 miles downstream near Benton, Tennessee.

A schematic profile of the Ocoee Reservoirs System from Ocoee river mile 35 (Ocoee No. 3 Reservoir) to river mile 10 (Ocoee No. 1 Dam) is shown in Figure III.A.10-2.

The Ocoee projects were originally designed as single-purpose projects (hydroelectric power generation) with incidental recreational and flood control benefits. The Ocoee reservoirs are among the smallest in the TVA system, and provide slightly more than 2 percent of the total hydroelectric capacity of the TVA system.

A.10.b.1. Blue Ridge Reservoir

The Blue Ridge Reservoir, operated by TVA, is located 41 miles upstream from Ocoee Reservoir No. 1, in northern Georgia near the tri-State borders. The dam is located at Toccoa river mile 53. Blue Ridge Reservoir was impounded in 1930. The reservoir's uses are peaking power production, boating, swimming, and fishing. Run-off from the uppermost 232 square miles of the region's drainage area is regulated by the Blue Ridge Dam.

At full pool, Blue Ridge Reservoir is about 11 miles long, 3,300 acres in surface area, and 155 feet deep at the dam, with an average depth of 59 feet. The reservoir holds 193,000 acre-feet in volume at normal maximum pool. The useful controlled storage is 183,900 acre-feet. The average unregulated flow at Blue Ridge Dam is 614 cubic feet per second (cfs) from a drainage area of 232 square miles. This flow is computed from reservoir discharges corrected for changes in reservoir storage volume. The rate of discharge results in an average theoretical residence time of about 159 days. Blue Ridge Powerhouse has one hydropower unit with a generating capacity of 20 megawatts.

Although Blue Ridge Reservoir was not intended to provide flood control (only peaking power production), it has a potential useful controlled vertical storage of 101 feet [1,691 to 1,590 feet above mean sea level (MSL)], indicative of potentially large water level draw-downs. However, the annual drawdown averages only 36 feet (TVA, 1992).

TVA monitoring in the forebay of Blue Ridge Reservoir in 1991 showed the water quality to be generally good, as indicated by the low nutrient level, high water clarity, and fair algal productivity. It had the highest quality littoral (shallow-water) zone fish community of all TVA storage reservoir forebays, and it had the best water quality conditions of the five Hiwassee basin reservoirs sampled in 1991 (Dycus and Meinert, 1992).

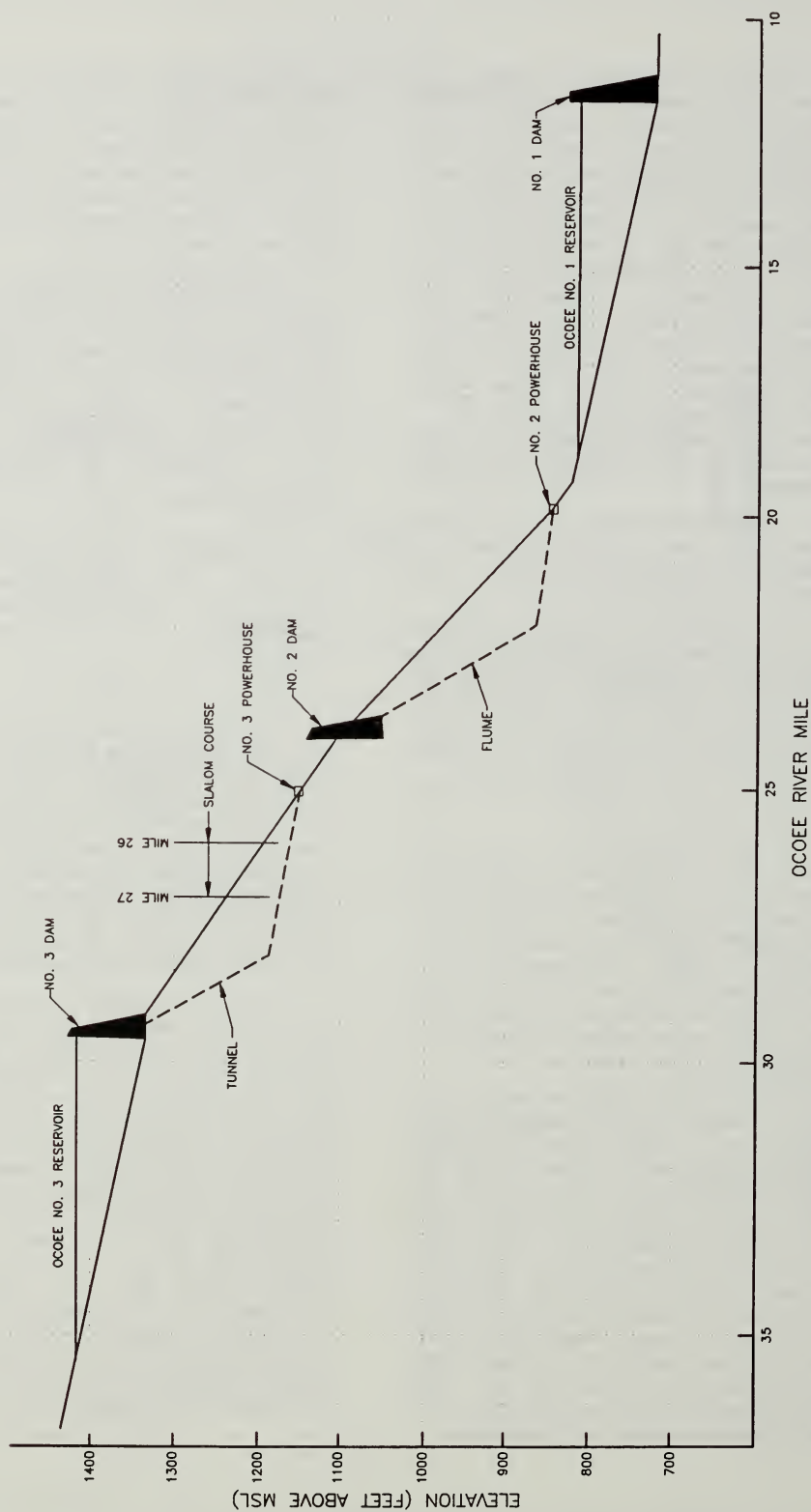
The Toccoa River flows out of Blue Ridge Reservoir through the dam and continues in a meandering northwesterly direction toward Copper Basin. After crossing the Georgia-Tennessee State line, the Toccoa River is named the Ocoee River.

A.10.b.2. Ocoee No. 3 Reservoir

Downstream from the Tennessee state line, the Ocoee River receives drainage from Copper Basin and is then impounded to form Ocoee No. 3 Reservoir at Ocoee river mile 29.2. Ocoee No. 3 Dam was closed in 1942. Ocoee No. 3 Reservoir is used for power generation and for recreational purposes. It has approximately 24 miles of shoreline. The theoretical hydraulic retention time of Ocoee No. 3 Reservoir is less than 2 days (assuming normal maximum pool volume and average unregulated flows).

At full pool, Ocoee No. 3 Reservoir is about 7.0 miles long and 480 acres in surface area with an average depth of 6.0 feet. The useful controlled storage volume is 3,629 acre-feet. The average unregulated flow at Ocoee No. 3 Dam is 1,167 cfs from a drainage area of 492 square miles. Outflow from Ocoee No. 3 Dam is diverted from the natural streambed channel for power generation purposes and directed north-northeast through a 2.5-mile-long tunnel to the Ocoee No. 3 Powerhouse at approximately river mile 25.0. It is this river reach, between Ocoee Dam No. 3 and Ocoee Powerhouse No. 3, which normally does not receive discharge because of power production operations, that is proposed to accommodate the Olympic competitive channel. The low level of flow, about 50 cfs, comes from tributaries be-

Figure III. A. 10-2
Schematic of the Ocoee Reservoirs System



tween Ocoee Dam No. 3 and Ocoee Powerhouse No. 3.

Since the construction of Ocoee No. 3 Dam, Ocoee No. 3 Reservoir has functioned as a sediment trap, accumulating the major portion of the Ocoee River sediment load which would otherwise accumulate in Ocoee No. 1 Reservoir. However, because accumulated sediments periodically block the intakes of the tunnel to the Ocoee No. 3 Powerhouse, continued operation of Ocoee No. 3 for power production has historically necessitated the flushing of sediment through the sluice gates to downstream reaches. TVA is evaluating acceptable alternative methods to remove sediment from the intakes of Ocoee No. 3 Powerhouse, and will no longer be conducting sluicing operations (Pryor, 1992). Ocoee No. 3 has lost more than 80 percent of its original storage capacity due to sedimentation associated with erosion in the Copper Basin, and is no longer an effective sediment trap.

A.10.b.3. Ocoee No. 2 Reservoir.

The water released through the Ocoee No. 3 Powerhouse re-enters the natural stream channel at approximately river mile 25.0 and flows downstream to Ocoee No. 2 Reservoir and Dam, located at river mile 24.2. This reservoir is riverine in nature and has no effective storage capacity. The uses of the No. 2 Reservoir are power generation and recreational purposes. The predominant recreational use is whitewater rafting in the tailwater of the Dam. Ocoee No. 2 Dam was built in order to divert the flow from the natural streambed into a flume for power generation, and the storage capacity provided is considered negligible.

The average unregulated flow at Ocoee No. 2 Dam is 1,209 cfs from a drainage area of 512 square miles. The Ocoee No. 2 Dam is a rock-filled timber-crib dam, that, during normal operation for power generation, diverts the flow to a wooden flume. After the water is conveyed through the wooden flume for approximately 5 miles, the water passes through Ocoee No. 2 Powerhouse, at river mile 19.7, and once again re-enters the natural stream channel at that point.

During periods selected by TVA, for recreational purposes and/or repair work on the flume, water released from Ocoee No. 3 is spilled at Ocoee No. 2 Dam and flows in the portion of the natural riverbed that is bypassed when Ocoee No. 2 is operated for power production. The section of the river below Ocoee No. 2 Dam receives considerable use by recrea-

tional whitewater rafters as a result of its relatively steep gradient (60 feet per mile), which provides Class III and IV rapids when the river is flowing. The minimum and maximum flow rates provided are 1,000 cfs and 2,000 cfs, respectively with an average flow rate of 1,200 cfs (TVA, 1991; Tidwell, 1993).

A.10.b.4. Lake Ocoee

Approximately 8 miles downstream from the Ocoee No. 2 Powerhouse, the river is impounded to form Lake Ocoee (Ocoee No. 1 Reservoir). The reservoir extends from approximately river mile 17.0 to river mile 11.9, where the concrete gravity Ocoee Dam No. 1, built in 1911, and the powerhouse are located. The reservoir is approximately 7.5 miles long and has an average width of 0.3 mile, with a surface area of 1,900 acres at full pool. Lake Ocoee is used for power production with incidental recreational (swimming, boating, fishing) and flood-control utilization. The reservoir has approximately 47 miles of shoreline at its average operating capacity. Water released through Ocoee No. 1 Dam confluences with the Hiwassee River about 12 miles downstream, near Benton, Tennessee.

The average unregulated flow at Ocoee No. 1 Dam is 1,416 cfs from a drainage area of 595 square miles. Lake Ocoee is one of the smaller of the TVA tributary reservoirs with a normal maximum pool volume of 83,300 acre-feet and a mean depth of 45 feet at normal maximum water level. The depth at the dam is approximately 100 feet from the spillway to the base of the dam. Because of the relatively small volume and high flow rates, the theoretical annual average hydraulic retention time is 27 days, which is considerably less than most of the other TVA tributary reservoirs. Further, during periods of high flow, such as during winter and spring storms, the retention time may decline to a week or less. Lake Ocoee was designed with a useful controlled drawdown of 20 feet (838-818 feet MSL), and the annual drawdown averages approximately 7.0 feet.

The decrease in effectiveness of Ocoee No. 3 Reservoir as a sediment trap, coupled with the periodic sluicing operations, have increased sedimentation in Lake Ocoee by 50 percent since the mid-1970s. Much of the silt passing through and/or released from Ocoee No. 3 Reservoir has been deposited as a large delta in the upper end of Lake Ocoee.

A.10.c. Channel Stability

This section presents a discussion of the three elements, erosion, sedimentation and flooding, which influence channel stability.

A.10.c.1. Erosion

Erosion from small watersheds within the Copper Basin area in the mid-1940s has been estimated at 30,000 to 40,000 tons per square mile per year (tons/mi²/year). In contrast, erosion rates for forested and agricultural areas in the region were estimated at 25 and 300 tons/mi²/year, respectively. Current estimates of erosion rates and/or sediment delivery rates for the Ocoee watershed are not available, but the acreage of barren land in Copper Basin has declined from 32,000 acres in the early part of this century to 8,600 acres in 1984 (TVA, 1986; Muncy, 1993).

In the area of the proposed competitive channel, the natural river channel downstream of Ocoee No. 3 Dam is a broad (150-200 feet), rocky channel with a steep left bank and U.S. Highway 64 and a steep bank on the right. The minimum elevation difference between the channel bottom and U.S. Highway 64 is approximately 10 feet at river mile 26.13.

The natural channel bottom is formed by exposed metamorphic rock formations. Numerous boulders and ledges are present and contribute to the overall channel hydraulics. The average channel slope in the area of the proposed competitive channel is 53 feet per mile.

The channel bottom consists of bedrock, river boulders, and gravel deposits. The majority of the ledges and permanent features are bedrock. The channel rock formation, which is interbedded sandstone, quartzite, shale, and slate, is not particularly subject to erosion.

A.10.c.2. Sedimentation

Decades of erosion in the Copper Basin have caused extensive sediment deposits in Ocoee No. 3 Reservoirs and Lake Ocoee. Ocoee No. 3 Reservoir has lost approximately 80 percent of its original volume, is less than 50 feet deep at the dam, and has an average depth of only 6 feet. Because water passes through Ocoee No. 3 Reservoir quickly (usually in less than 2 days), there is little time for settling of the suspended sediment load that the Ocoee River carries into the reservoir. Nevertheless, the intakes to Ocoee No. 3 Powerhouse periodically become blocked by accumulated sediments. The reach of the Ocoee River between

Ocoee No. 3 Dam and the upper end of Lake Ocoee has pooled water only immediately upstream from Ocoee No. 2 Dam and has not accumulated a significant volume of sediment. Lake Ocoee has lost approximately 24 percent of its original volume, has an average depth of 45 feet, and is approximately 100 feet deep at the dam. At the present rate of filling, Lake Ocoee is estimated to have a remaining useful life of approximately 100 years (TVA, 1991).

A.10.c.3. Flooding

The Ocoee reservoirs are not operated for flood control and do not have substantial flood storage capacity. Storage volume in Lake Ocoee for late winter and spring inflows is provided so that the water can be saved for power generation at a later date rather than being lost over the spillway. This storage for power generation sometimes provides some incidental flood control benefits downstream from Ocoee No. 1 Dam.

The Ocoee River is subject to extreme flood events. A severe flood, rated in excess of a 500-year frequency flood, occurred on February 16, 1990. During the flood, the flow rate of the river peaked at 43,500 cfs (estimated from film footage at river mile 29.2, Ocoee No. 3 Dam). During this flood, the Ocoee River was estimated to have risen 17.5 feet in the area of the proposed competitive channel (river mile 26.2-26.8). The 100-year flood rate has been estimated at 18,000 cfs at river mile 37.5 (Tidwell, 1993).

The site of the proposed competitive channel and the surrounding unincorporated areas of Polk County are recent participants in the National Flood Insurance Program (NFIP), administered by the Federal Emergency Management Agency (FEMA). FEMA maps floodplain elevations on Flood Insurance Rate Maps (FIRMs), which categorize all areas in the community regarding floodplain status for flood frequency (100- and 500-year floods). Areas of 100-year flood are called areas of special flood hazard. Floodplain and floodway boundaries are shown on these FIRMs.

Because Polk County is a recent participant in NFIP, a FIRM for the site has not yet been issued by FEMA. The only existing flood map is the Flood Boundary and Floodway Map (FBFM) issued by the U.S. Department of Housing and Urban Development, Federal Insurance Administration, effective January 19, 1979. This map, Community-Panel Number 470261 0007 A, shows that the Ocoee River,

reservoirs, shorelines, and the larger tributaries are classified as Zone A, Special Flood Hazard Area (see Figure III.A.10-3). However, it will not be known until the FIRM is issued if these special flood areas are in the 100-year floodplain, the 500-year floodplain, or a designated floodway. A designated floodway is the channel of the river and the adjacent land area that must be reserved in order to discharge the base flood without a cumulative increase in the surface water over a designated height. The FEMA standard for this height increase is 1 foot.

The TVA is currently conducting a study to delineate the floodplain and regulatory floodway and to determine flood elevations for the FIRM. This study will be completed in the fall of 1993, and a meeting will be held with the local communities to discuss the results of the study (Hayden, 1993).

A.10.d. Water Availability

The Ocoee River system dams are operated to meet power system demands as economically as possible. In addition, releases are also provided for whitewater recreation use. Hydroelectric - power generation is used to provide peaking power quickly for those times when daily power demands are the highest. Hydropower generation is also scheduled for high demand times of the week (generally during the 5-day work week) and year (June through August and December through February).

A.10.d.1. Ocoee No. 3 Reservoir

Total inflows to Ocoee No. 3 Reservoir vary from a low of 667 cfs in December to a high of 1,276 cfs in April (long-term monthly averages by TVA). On an annual basis, about 56 percent of the total inflow to Ocoee No. 3 consists of releases from Blue Ridge Dam, while about 44 percent enters locally from minor tributaries downstream from Blue Ridge Dam. On a monthly basis, the percentage of local inflow ranges from a high of 71 percent in March to a low of 23 percent in September. Long-term average discharges from Ocoee No. 3 Reservoir also vary seasonally, from a low of 667 cfs in December a high of 1,276 in April, paralleling the inflow rates.

Pool elevations at Ocoee No. 3 Reservoir ordinarily do not vary significantly over the course of the year, except during historic sediment sluicing events. After the sluicing operations were completed, the pool elevation returned to normal.

Water flows from the Ocoee No. 3 Reservoir to Powerhouse No. 3 through a 2.5-mile long tunnel. Ocoee No. 3 Powerhouse has one hydropower unit with a generating capacity of 47 megawatts (mW) (TVA, 1990). This is approximately 42 percent of the total generating capacity of the Ocoee projects, and about 0.8 percent of the total generating capacity of the TVA system.

A.10.d.2. Ocoee No. 2 Reservoir

Since Ocoee No. 2 Reservoir is riverine in nature, the dam merely diverts flow to the flume without impounding a large pool. The lack of storage volume means that flows through Ocoee No. 2 Reservoir are equal to whatever is released from Ocoee No. 3 Dam through the tunnel, in addition to inflow from the 20-square-mile local drainage area between Ocoee Dams No. 2 and No. 3.

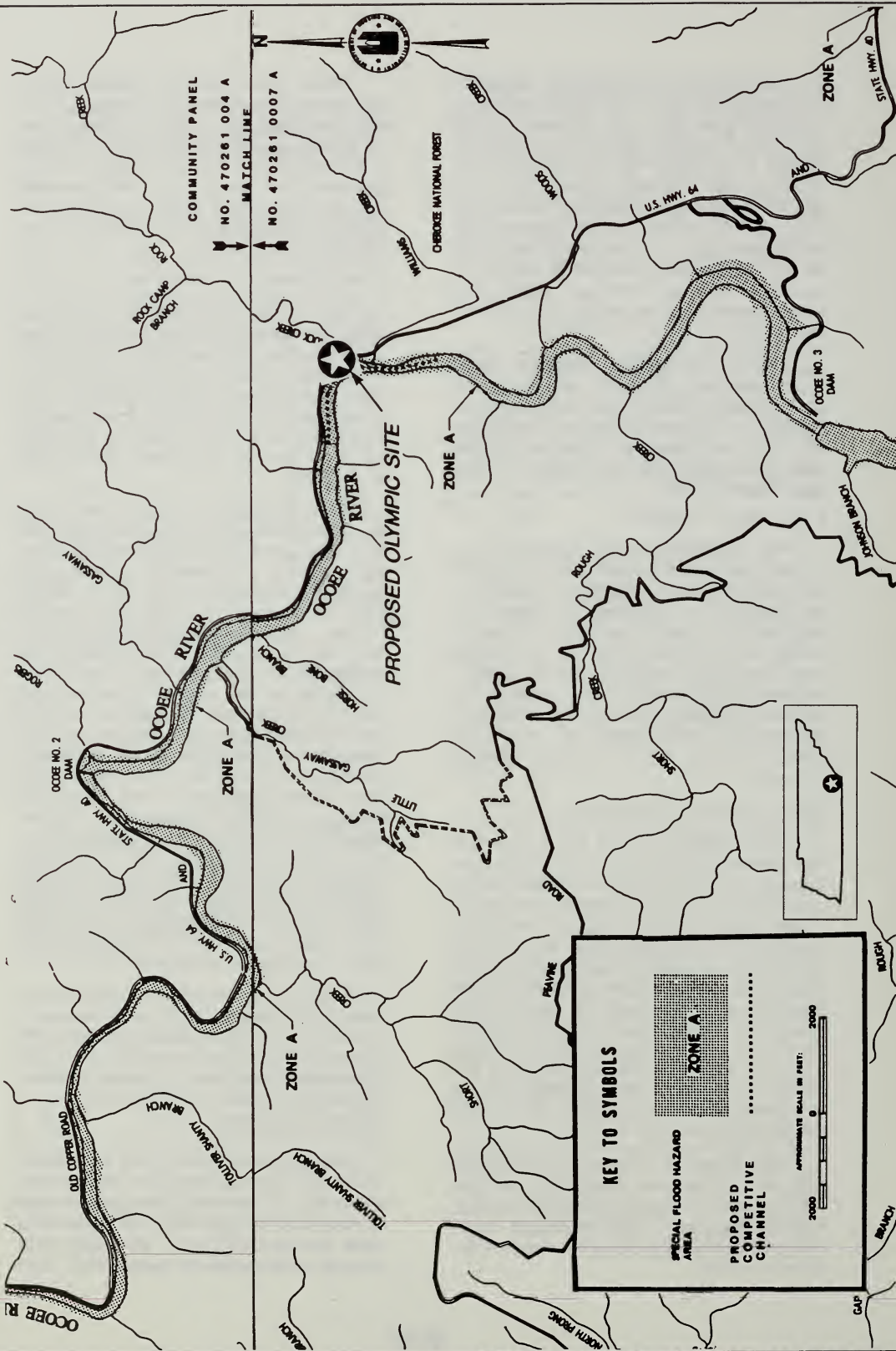
For 106 days per year, from March through October, TVA spills water (minimal flow) from Ocoee No. 2 to the riverbed to provide whitewater recreation opportunities. Including maintenance days, TVA releases water through Ocoee No. 2 Dam for a total of 116 days per year. The 1993 schedule shows that, from the middle of March through May, releases are on weekends only. From June through August, the releases occur every day except Tuesday and Wednesday. From September through October, releases occur on weekends only, except for the first 2 weeks of October, when releases occur almost every day. From November through the first 2 weeks of March, no recreational releases occur. The average flow rate provided for recreational releases is 1,200 cfs (Sandifer, 1993). User fees collected by commercial whitewater outfitters are used to repay a \$6.4 million Congressional appropriation that reimbursed TVA and its power customers for the loss of generating capacity to support the recreational releases.

Ocoee No. 2 Powerhouse has two hydropower units with a total generating capacity of 18 mW (TVA, 1990). This is approximately 31 percent of the total generating capacity of the Ocoee projects, and about 0.6 percent of the total generating capacity of the TVA system.

A.10.d.3. Lake Ocoee

Total inflows to Lake Ocoee vary from a low of 870 cfs in December to a high of 1,656 cfs in April. On an annual basis, approximately 81 percent of the total inflow to Lake Ocoee enters through Ocoee No. 3 Reservoir, while about 19 percent enters the system locally from

Figure III. A. 10-3



minor tributaries between Ocoee Dams No. 3 and No. 1. On a monthly basis, the percentage of local inflow ranges from a high of 26 percent in February to a low of 11 percent in April. During the summer and fall months, the majority of the total inflow originates as outflow from Blue Ridge Dam. During the winter and spring, however, the largest portion of the total inflow originates as local inflow between Blue Ridge Dam and Ocoee No. 3 Dam. Long-term average discharges from Lake Ocoee vary seasonally from a low of 970 cfs in December to a high of 1,556 cfs in April.

Pool elevations at Lake Ocoee are varied seasonally. An elevation of 828.5 feet MSL is ordinarily maintained from May to October, then the elevation is dropped to 821 feet in January and February. This operation furnishes limited auxiliary flood control benefits. TVA coordinates discharges from Ocoee No. 1 Dam with releases from Apalachia Dam (on the Hiwassee River near the North Carolina border) to provide a combined daily average discharge from the two dams equal to or greater than 600 cfs. This flow enhances the ability of the Hiwassee River to assimilate wastewater discharges.

Ocoee No. 1 Powerhouse has five hydro-power units with a total generating capacity of 18,000 kW. This is approximately 27 percent of the total generating capacity of the Ocoee projects, and about 0.5 percent of the total generating capacity of the TVA system.

A.10.e. Water and Sediment Quality

The State of Tennessee has designated the waters of the Ocoee River and its reservoirs (river miles 0 through 37.9) for the following use classifications: support of fish and aquatic life, recreation, industrial water supply, livestock watering, wildlife, and irrigation. The segment from river miles 0 through 17 is also designated for domestic water supply (State of Tennessee Water Quality Standards, Chapter 1200-4-4: Use Classifications for Surface Waters, December 1991). The 305(b) report on water quality submitted by the State of Tennessee to EPA in 1988 listed Lake Ocoee and Ocoee No. 2 Reservoir, and 189 acres of No. 3 Reservoir, as not supporting their designated uses. The remaining 378 acres of Ocoee No. 3 Reservoir were characterized as partially-supporting their designated uses. These issues are addressed in relation to designated uses and other appropriate standards.

Four water quality issues were identified as relevant in terms of potential effects of the proposed venue: the amount of sediments suspended in the water, the capability of the Ocoee River water to assimilate potential acidic discharges, the metals content of the water, and the sediment quality. These issues are addressed in relation to designated uses and other appropriate standards.

A.10.e.1. Suspended Sediments

The concentrations of sediments suspended in the water, referred to as suspended solids, vary along the Ocoee River. A single sampling event conducted by Tennessee Department of Health and Environment (TDHE) in 1981 showed a suspended solids concentration of 1 milligram per liter (mg/L) at the proposed venue location (at river mile 25). Upstream at river mile 19.6, TDHE reported suspended solids concentrations ranging from 1 to 148 mg/L, with an average value of 14 mg/L. These data included 21 samples collected from 1984 to 1989 (TDHE data as reported by Cox, 1990). Based on the reported concentrations of suspended solids, waters of the Ocoee River near the proposed venue location have a relatively low turbidity. (Turbidity reduces light penetration and tends to inhibit development of rooted aquatic plants and microscopic floating algae that serve as food sources for fish and other aquatic animals. Many streams are naturally turbid, and support organisms adapted for those conditions.) Concentrations of suspended solids increase during precipitation events, and during massive releases of sediments in "sluicing" operations from the Ocoee No. 3 Reservoir historically conducted by TVA for several weeks every winter prior to 1990 (Cox, 1990).

Sluicing operations, conducted to maintain operability of the Ocoee No. 3 Powerhouse, have been reported to degrade the water quality of the river in terms of increased suspended solids and metals. A concentration of suspended solids of 13,000 mg/L was reported near the venue site during sediment sluicing operations on November 4, 1980, and concentrations as high as 3,000 mg/L were detected further downstream from the Ocoee No. 3 Dam (Cox, 1990). A TVA assessment of the effects of sediment sluicing stated that:

"These sediment sluicing operations, which in recent years have been conducted for several days to several weeks every winter, severely degrade water qual-

ity in the Ocoee River. Turbidity, suspended solids, iron, copper, manganese, and zinc increase as much as a thousandfold over background levels. The suspended sediment scours the rocks in the channel, and when the operation ends, several inches of new sediments are deposited on the rocks downstream. When the sediment plume reaches Ocoee No. 1 Reservoir [i.e., Lake Ocoee], it sometimes mixes with the surface waters and gives the entire reservoir a 'muddy' appearance" (Cox, 1989).

A.10.e.2. Capability to Assimilate Acid Discharges

The capability of the water to assimilate acidic discharges (buffering capacity) is relevant because pyrite rocks present in the proposed venue location contain high sulfide mineral concentrations capable of releasing acids. A recent evaluation of the geology at the venue site showed that 17 of 33 of rock samples collected had a net potential for release of acidic drainage (see Appendix G-6). The potential acid release, measured in calcium carbonate-equivalents, ranged from 5 to 67.6 grams of calcium carbonate per kilogram of rock (Appendix G-6).

The buffering capacity of the Ocoee River water can be roughly evaluated as the interaction of three parameters: water pH, acidity, and alkalinity. Waters of the Ocoee River have a moderately low pH. A single sample collected in 1981 by TDHE near the proposed venue location (at river mile 25) had a pH of 7 standard units. Downstream of the venue site, at river mile 19.6, analysis of 21 samples collected by TDHE from 1984 to 1989 had pH values ranging from 5.8 to 7.8, with an average value of 6.5 (TDHE data as reported by Cox, 1990).

Acidity and alkalinity of the Ocoee River water near the proposed venue location appear to be low. A single water sample collected by TDHE at river mile 19.6 had an acidity of 3 mg/L and an alkalinity of 7 mg/L (both values expressed in calcium carbonate equivalents), while a 1-year survey conducted by TVA in 1982-1983 reported an average value of 7 mg/L for both acidity and alkalinity at river miles 14 and 15.5 (Cox, 1990). The reported concentrations for 24 samples collected during the latter study ranged from 1 to 12 mg/L for alkalinity, and from 3 to 14 mg/L for acidity. Due to the

low alkalinity, the buffering capacity of the river water is expected to be relatively low.

A.10.e.3. Metals in Surface Waters

Elevated concentrations of metals in the water, particularly when present in dissolved form, can restrict or eliminate aquatic life in streams and reservoirs. Historical data on metals concentrations at several monitoring stations located in the Ocoee River were obtained from TVA's water quality database (STORET, 1993). This database encompasses sampling events conducted by the State and by TVA from 1961 to 1992, but it primarily reflects conditions of the Ocoee River during the period from 1973 through 1983 when intensive surveys and monitoring programs were conducted.

Water quality data in the Ocoee River are summarized in Table III.A.10-1. The STORET database did not include water quality data for the proposed venue location (river mile 26.6 through 26.2), at which the primary water source is runoff from a small watershed adjacent to the site. Water quality information available in the database included data from sampling sites located downstream from the venue. Because these sites, unlike the venue location, receive water discharges from Ocoee No. 3 Reservoir through a tunnel that leads to the Ocoee No. 3 Powerhouse (river mile 25), the available water quality data do not necessarily represent the conditions of the venue location.

To assess baseline conditions downstream from the venue location, available water quality data were combined for sampling stations located in the free-flowing section of the Ocoee River enclosed by the discharges of the Ocoee No. 2 and No. 3 Powerhouses (river miles 18.4 to 25), and for stations located in the Lake Ocoee (river miles 11.9 to 18.5). The data summary (Table III.A.10-1) indicates that waters of the Ocoee River historically have had elevated concentrations of several metals, particularly copper, lead, mercury, silver, and zinc. For these metals, the free-flowing segment of the river had significantly higher average concentrations than the downstream Lake Ocoee. Average values for other metals were similar for both river segments analyzed (Table III.A.10-1).

Differences in metals concentrations between the two river segments analyzed appear to be due to samples collected during periods of extremely high concentrations of suspended solids associated with sediment releases from Ocoee No. 3 Reservoir. These sediment sluic-

TABLE III.A.10-1
Historical Water Quality Values for Two Segments of the Ocoee River

Ocoee River from River Miles 18.5 to 25					Ocoee River from River Miles 11.9 to 18.5				
Parameter (µg/L)	No. of Samples	Mean	Adjusted Mean ^(a)	Maximum	Minimum	No. of Samples	Mean	Maximum	Minimum
Total Hardness (as CaCO3)	85	43,500	43,500	110,000	13,000	67	35,080	76,000	400.0
Cyanide, total	23	<10	<10	<10	<10	3	<10	<10	<10
Cyanide, free	14	15	15	4	10	6	<10	<10	<10
Ammonia, dissolved	0	na ^(b)	na	na	na	5	216	540.00	10.00
Fluoride, total	77	73.9	74	100.00	20.00	70	77.6	100.00	20.00
Fluoride, dissolved	29	64.5	65	100.00	50.00	0	na	na	na
Aluminum, total	37	207.57	208	740	50	87	363.45	2,100	50
Antimony, total	5	32	32	50	20	0	na	na	na
Antimony, dissolved	0	na	na	na	na	0	na	na	na
Arsenic, total	49	3,2041	3.2	20	1	11	1.6727	2.00	0.20
Arsenic, dissolved	0	na	na	na	na	0	na	na	na
Barium, total	35	101.03	101	580	10	41	100	100	100
Beryllium, total	6	<10	<10	<10	<10	28	<10	<10	<10
Boron, total	6	83.333	83	100	70	31	203.87	1,000	10
Cadmium, total	96	2,3719	2.11 ^(a)	20	0.1	127	1.3016	6	0.2

TABLE III.A.10-1 (Continued)
Historical Water Quality Values for Two Segments of the Ocoee River

Parameter (µg/L)	Ocoee River from River Miles 18.5 to 25				Ocoee River from River Miles 11.9 to 18.5				
	No. of Samples	Mean	Adjusted Mean ^(a)	Maximum	Minimum	No. of Samples	Mean	Maximum	Minimum
Cadmium, dissolved	4	1.25	na	2	1	6	0.75	1	0.4
Chromium, total	50	6.46	6.5	14	1	38	5	5	5
Chromium, dissolved	0	na	na	na	na	0	na	na	na
Cobalt, total	0	na	na	na	na	3	5.333	6	5
Copper, total	148	279.06	64 ^(a)	6,100	5	199	68.643	3,400	5
Copper, dissolved	8	18.625	20.5 ^(a)	36	5	6	11.667	20	10
Iron, total	186	9,402	1,060 ^(a)	490,000	10	241	796.06	14,000	10
Iron, dissolved	6	27.333	na	50	9	6	13.833	36	2
Ferrous, iron	69	254.49	254	810	40	39	102.56	230	20
Lead, total	106	115.14	18 ^(a)	2,900	1	132	36.189	1,600	1
Lead, dissolved	6	27.333	na	50	9	6	13.833	36	2
Lithium, total	6	<10	<10	<10	<10	28	<10	<10	<10
Manganese, total	178	241.82	185 ^(a)	4,000.0	10.0	227	184.46	2,000.0	10.0
Manganese, dissolved	6	27.333	na	50	9	6	13.833	36	2
Mercury, total	80	0.227	0.23	0.7	0.2	64	0.21875	0.6	0.2

TABLE III.A.10-1 (Continued)
Historical Water Quality Values for Two Segments of the Ocoee River

Ocoee River from River Miles 18.5 to 25					Ocoee River from River Miles 11.9 to 18.5				
Parameter (µg/L)	No. of Samples	Mean	Adjusted Mean (a)	Maximum	Minimum	No. of Samples	Mean	Maximum	Minimum
Mercury, dissolved	78	174.08	174	580.0	20.0	95	124.74	493.0	5.0
Nickel, total	47	18.83	19	50	1	36	44,444	140	10
Nickel, dissolved	0	na	na	na	na	0	na	na	na
Selenium, total	46	2,0652	2	10	1	61	18.00	1,000	1
Selenium, dissolved	0	na	na	na	na	0	na	na	na
Silver, total	7	75.0	75	445.0	10.0	28	12,857	20.0	10.0
Silver, dissolved	0	na	na	na	na	0	na	na	na
Strontium, total	0	na	na	na	na	3	120	200	60
Thallium, total	0	na	na	na	na	0	na	na	na
Thallium, dissolved	0	na	na	na	na	0	na	na	na
Titanium, total	8	1,000	<1,000	1,000	1,000	28	1,000	1,000	1,000
Zinc, total	142	471.08	233(a)	8,000	8	196	253.87	3,400	10
Zinc, dissolved	14	126.75	127	360	27	6	88,333	140	40

^a Excluding six samples collected during sediment sluicing events (March 28, 1978; January 12, 1980; November 4, 1980).

^b na - not analyzed.

ing operations significantly increased the concentration of some metals in the water, in some cases as much as one thousand-fold over background levels (Cox, 1990). Wide differences between minimum and maximum values reported (Table III.A.10-1) reflect those extreme changes in water quality. Average data for the free-flowing segment of the Ocoee River more closely resembles water conditions in the Lake Ocoee after exclusion of samples collected during sediment sluicing events (Table III.A.10-1).

Trends in water quality of the Ocoee River are difficult to assess based on available data because most monitoring stations have been surveyed on an irregular basis. There is, however, some indication that water quality near the project site has improved in terms of metals concentration. A significant reduction in copper and zinc concentrations over a 30-year observation period was detected in an extensively monitored station (database station No. 002050) located 6 miles downstream from the project site, at river mile 19.6 (STORET, 1993). At this station, concentrations of total copper in the water decreased from an average of 128 µg/L for the 1972-1975 period, to 36 µg/L for the 1983-1989 period. A lower average value, 21 µg/L, was obtained from recently collected data (1990-1992). For those three monitoring periods, the average values for total zinc were 382, 146, and 69 µg/L, respectively.

Due to the lack of historical water quality data at the proposed venue location, a sampling survey was conducted in January 1993. The survey documented water conditions in terms of pH, hardness, cyanide, and metals from analysis of four grab samples collected at the following locations:

- One sample from the headwaters of the Ocoee No. 3 Reservoir, upstream from the venue site (river mile 35).
- Two samples from the free-flowing segment of the Ocoee River where the proposed venue is located. The first site was located near the "Blue Hole" (river mile 26.6), and the second site was located approximately 2 miles downstream, in the backwaters of the Ocoee No. 2 Reservoir (river mile 24.4).
- One sample from the Lake Ocoee, downstream from the venue area (river mile 18.5).

Results of water samples analyzed during the January 1993 survey are presented in Table

III.A.10-2. This table includes, as a reference, historical data for two segments of the Ocoee River (data from Table III.A.10-1). The survey showed that water samples collected in the Ocoee River in January 1993 were slightly acidic, and had low hardness values. Values of pH measured in multiple locations from river mile 12.5 to mile 35 ranged from 6 to 7. Somewhat lower pH values were detected downstream of road cuts in some of the Ocoee River tributaries. Average water hardness, a parameter that affects toxicity of metals to aquatic organisms, was approximately 6 mg/L (as calcium X carbonate), below typical values for the river (Table III.A.10-1). The reduced water hardness was probably associated with rain events prior to the survey.

No significant differences in metal concentrations were observed among the four sites sampled during the January 1993 survey (Table III.A.10-2). In relation to historical data on metals concentrations, the recently collected water samples had a lower metals content. Average concentrations of antimony, copper, lead, nickel, silver, and zinc in the January 1993 samples were 20 to 80 percent lower than the historical averages, both in the free-flowing segment of the Ocoee River, and in Lake Ocoee. Most metals analyzed during the January 1993 survey were below analytical detection limits.

To assess potential suitability of the Ocoee River waters for aquatic organisms, available metals and cyanide data were compared to Tennessee water quality standards for protection of fish and aquatic life (Table III.A.10-2). These standards identify a maximum allowable concentration of a metal, or other contaminants, that is not expected to result in adverse effects on aquatic organisms based on toxicity levels tested in laboratory conditions (State of Tennessee, 1992). Two types of water quality standards are available: an acute standard, and a chronic standard. The chronic standard identifies a relatively low concentration of a contaminant that is not expected to have adverse effects on organisms when exposed over an extended period (i.e., a substantial part of their life cycle). The acute water quality standard is a higher concentration of the contaminant that can be tolerated over short exposure periods (typically a few days), but that is likely to have adverse effects on organisms when the exposure is sustained over longer periods.

Historical data for two segments of the Ocoee River showed substantial exceedances of some of the water quality standards, indicating

TABLE III.A.10-2
Water Quality Criteria and Average Values for Three Segments of the Ocoee River

Parameter	Average Concentration (ug/L) for River Miles				Mile 35 Jan 93 (b)	Tennessee Water Quality Criteria(c)		Maximum Contaminant Level Goal (ug/L)(d)
	From 11.9 to 18.5		From 18.5 to 27.0			Acute (ug/L)	Chronic (ug/L)	
	Historical (a)	Jan 93 (b)	Historical (a)	Jan 93 (b)				
Total Hardness (as CaCO3)	35,080	5,320	43,500	5,700	4,350			--
Cyanide, total	<10	<10	<10	<10	<20	22	5.2	200
Cyanide, free	<10	na(e)	15	na	na			--
Ammonia, dissolved	216	na	na	na	na			
Fluoride, total	78	na	74	na	na			4,000
Fluoride, dissolved	na	na	65	na	na			--
Aluminum, total	363	na	208	na	na			--
Antimony, total	na	<10	32	<10	<10			6
Antimony, dissolved	na	<10	na	<10	<10			--
Arsenic, total	1.7	<10	3.2	<10	<10	360(e)	190(e)	50
Arsenic, dissolved	3.6	<10	na	<10	<10			--
Barium, total	100	na	101	na	na			2,000
Beryllium, total	<10	<10	<10	<10	<10	130	5.3	4
Beryllium dissolved	na	<10	na	<10	<10			--
Boron, total	204	na	83	na	na			--
Cadmium, total	1.3	<5	2.11(f)	<5	<5			5
Cadmium, dissolved	0.8	<5	1.3	<5	<5	2	0.7	--
Chromium, total	5.0	<5	6.5	<5	<5	-	100	100
Chromium, dissolved	na	<5	na	<5	<5			--
Cobalt, total	5.3	na	na	na	na			--
Copper, total	69	19.0	64(f)	16.0	23			1,300
Copper, dissolved	11.7	6.2	20.5(f)	8.3	8	9	7	--
Iron, total	796	na	1060(f)	na	na			--
Iron, dissolved	67	na	109(f)	na	na			--
Ferrous, iron	103	na	254	na	na			--
Lead, total	36	<5	18(f)	<5	<5			--
Lead, dissolved	14	<5	27	<5	<5	34	1	--

TABLE III.A.10-2 (Continued)
Water Quality Criteria and Average Values for Three Segments of the Ocoee River

Parameter	Average Concentration (ug/L) for River Miles				Mile 35 Jan 93 (b)	Tennessee Water Quality Criteria ^(c)		Maximum Contaminant Level Goal (ug/L) ^(d)
	From 11.9 to 18.5		From 18.5 to 27.0			Acute (ug/L)	Chronic (ug/L)	
	Historical (a)	Jan 93 (b)	Historical (a)	Jan 93 (b)				
Lithium, total	<10	na	<10	na	na			--
Manganese, total	184	na	185(f)	na	na			200
Manganese, dissolved	125	na	174	na	na			--
Mercury, total	0.22	<0.2	0.23	<0.2	<0.2	2.4	0.012	2
Mercury, dissolved	na	<0.2	na	<0.2	<0.2			--
Nickel, total	44	<5	19	<5	<5			--
Nickel, dissolved	na	<5	na	<5	<5	790	88	--
Selenium, total	18	<10	2	<10	<10	20	5	50
Selenium, dissolved	na	<10	na	<10	<10			--
Silver, total	13	<10	75	<10	<10			--
Silver, dissolved	na	<10	na	<10	<10	1		--
Strontium, total	120	na	na	na	na			--
Thallium, total	na	<10	na	<10	<10			0.5
Thallium, dissolved	na	<10	na	<10	<10			--
Titanium, total	<1000	na	<1000	na	na			--
Zinc, total	254	46	233(f)	47	35			--
Zinc, dissolved	88	54	127	39	24	65	59	--

Excluding six samples collected during sediment sluicing events (3/28/78; 1/12/80; 11/4/80).

(a) Historical data for the period 1972-1992 from STORET database.

(b) Data from Engineering-Science's survey at river miles 18.5, 24.4, and 26.6 (average), and 35.

(c) Criteria for protection of fish and aquatic life. Following the State guidelines, values are calculated at 50 mg/L hardness when ambient hardness is less than the 50 mg/L threshold (State of Tennessee, General Water Quality Criteria, Chapter 1200-4-3, 1991).

(d) MCLG identifies a non-enforceable concentration of drinking water contaminant that is protective of adverse human health effects, and allows an adequate margin of safety (Drinking Water Registration and Health Advisories, USEPA Office of Water, December 1992).

(e) Criteria for trivalent arsenic; state criteria for total arsenic is not available.

(f) Average values excluding six samples collected during sediment sluicing events.

potentially adverse conditions for aquatic life (Table III.A.10-2). Average historical concentrations of cadmium, lead, mercury, and selenium were above the chronic standard, while copper, silver, and zinc both exceeded the acute and chronic standards.

The January 1993 survey data characterized the waters of the Ocoee River as more suitable for supporting aquatic life (Table III.A.10-2). Cyanide and eight metals met Tennessee's acute water quality standards, while chromium, nickel, and zinc also met the chronic value. Only copper showed a slight elevation above the chronic standard. Comparisons of January 1993 data to chronic criteria could not be made for cadmium, lead, mercury and selenium due to limitations of the analytical procedures (high analytical detection limits relative to the low criteria values; Table III.A.10-2).

In terms of use of Ocoee River waters for recreational purposes, detected concentrations of metals and cyanide met EPA's guidelines for drinking waters and health advisories (EPA, 1992) (Table II.A.10-2). These guidelines, which exceed safety requirements for water contact activities, are also intended to protect users from consumption of contaminated fish.

A.10.e.4. Sediment Quality

Available historical data on metals concentrations in sediments from Lake Ocoee, the Ocoee No. 3 Reservoir, and the free-flowing segment of the River downstream from the Ocoee No. 3 Reservoir, are summarized in Table III.A.10-3. The data primarily reflect the conditions in the river and the Ocoee reservoirs during the period from 1972 through 1977 (STORET, 1993). To evaluate the significance of the data in terms of potential effects on benthic organisms, two reference values on sediment quality were used: the organism protection guideline and the limit of tolerance. The protection guideline is a contaminant concentration that, when exceeded, is likely to result in adverse effects on some benthic organisms. The limit of tolerance identifies a substantially higher concentration expected to be detrimental or lethal to the majority of benthic organisms. These sediment quality guidelines were obtained from New York State Department of Environmental Conservation (1991), because neither Tennessee, other states, or EPA have published criteria for metals in freshwater sediments. The toxicity of specific contaminants is influenced by site-specific conditions and, therefore, the empirical NYSDEC (NYS)

guidelines provide only a general characterization of the potential toxicity of the sediments.

Characterization of sediments, downstream from the proposed venue, below Ocoee No. 2 Dam, is limited to a single sample collected in 1975 from stream mile 19.6 (Table III.A.10-3). Sediments collected at this location had concentrations of metals that were within background concentrations reported for nearby reservoirs (Table III.A.10-3). Out of 13 metals analyzed, only cadmium, copper, and zinc had values exceeding NYSDEC guidelines for protection of benthic life. None of these metals was detected at concentrations approaching the limits of tolerance that characterize sediment conditions as detrimental to most benthic organisms. Historical data on sediment quality at the venue site were not available in the STORET database.

Elevated concentrations of metals in sediments have been reported in the Ocoee No. 3 Reservoir, upstream from the proposed site (Table III.A.10-3). Metals concentrations in the reservoir exceed those reported for the venue location. In the case of arsenic, copper, lead, mercury, and zinc, upstream values surpassed those at the free-flowing segment of the river by an order of magnitude. Average concentrations for most of those metals in the Ocoee No. 3 Reservoir significantly exceeded NYSDEC guidelines for protection of sediment dwelling organisms, and in the cases of copper and zinc, observed concentrations also surpassed the threshold value considered detrimental to most benthic species.

Because of the high concentration of metals detected, particularly of copper and zinc, Ocoee No. 3 Reservoir sediments do not appear capable of supporting benthic organisms, based on available reference values on sediment quality. The high metals content in sediments of the Ocoee River is attributable in part to the type of soils in the Copper Basin. Metal concentrations of copper, iron, lead, and manganese in Ocoee No. 3 Reservoir sediments are similar to typical values reported for the Copper Basin soils (Cox, 1990). For example, the average value for copper in the reservoir sediments is 572 milligrams per kilogram (mg/kg), while a 426 mg/kg concentration has been reported for soils of the basin. For lead, those concentrations are 163 mg/kg and 128 mg/kg, respectively. Sediments reaching the Ocoee No. 3 Reservoir are largely transferred to downstream reservoirs because the high degree of siltation in the reservoir no longer allows effective sediment retention (Cox, 1990).

TABLE III.A.10-3
Historical Data and Reference Values for Metal Concentrations
(mg/kg) in Sediments of the Ocoee River

Parameter	Lake Ocoee ^(a)	Downstream of Ocoee No. 2 Dam ^(b)	Ocoee No. 3 Reservoir ^(c)	Nearby Reservoirs ^(d)	Guideline Value ^(e)	Limit of Tolerance ^(f)
Aluminum	10,000	-	4,300	1,200-21,000	-	-
Antimony	<7	5	<7	<7	-	-
Arsenic	73	2	21	<2-20	5	33
Barium	33	80	63	22-240	-	-
Beryllium	1.3	-	<0.6	<0.5-1.6	-	-
Cadmium	7.1	1.0	2.1	<0.3-1.3	0.8	10
Chromium	39	10	7	6-37	26	111
Cobalt	49	-	14	2.7-31	-	-
Copper	1,587	30	572	5.9-73	19	114
Iron	100,670	7,512	24,200	10,000-47,000	24,000	40,000
Lead	1,193	10	163	5-300	27	250
Lithium	3.2	-	2	1.7-12	-	-
Manganese	1,416	97	567	96-4,000	428	1,100
Mercury	0.61	0.03	0.33	<0.11-1.1	0.11	2.0
Molybdenum	<7	-	<6	<7	-	-
Nickel	11	10	4.6	2.3-46	22	90
Selenium	<1	5	<1	0.3-8	-	-
Silver	2.6	-	1.7	0.7-2.1	-	-
Strontium	<3.2	-	<2.9	<3.4	-	-
Tin	<66	-	68	<70	-	-
Vanadium	<33	-	<34	<37	-	-
Zinc	1,716	91	1,346	21-580	85	800

^a Average of several sampling stations located between river miles 11.9 and 12.5 (1972-1977 data). The number of samples ranges from 1 to 9 (STORET, 1993).

^b 1975 data for a single location at river mile 19.6 (STORET, 1993).

^c Average of three sampling stations located between river miles 29.2 and 35.2 (1973-1977 data). The number of samples ranges from 1 to 7 (TVA, 1990; Table 6)

^d Data for 15 reservoirs of the Tennessee River operated by TVA (TVA, 1990; Table 6)

^e Guideline is the criteria proposed by NYSDEC (1991) for protection of sediment organisms

^f Limit of tolerance is a concentration in the sediment that would be detrimental to the majority of benthic species (NYSDEC, 1991)

Sediments in Lake Ocoee, downstream from the project site, show elevated metals concentrations, typically exceeding levels found at the Ocoee No. 3 reservoir (Table III.A.10-3). Concentrations of arsenic, copper, iron, lead, manganese, and zinc surpassed the tolerance limits considered detrimental to the majority of sediment organisms by NYSDEC (1991). Other metals present at elevated concentrations in Lake Ocoee were cadmium, chromium, and mercury, average concentrations of which exceed the NYSDEC guideline value for protection of sediment organisms. Other metals analyzed were present at concentrations typical of those measured in nearby reservoirs (Table III.A.10-3).

A TVA evaluation of sediment quality data in the Ocoee Basin during the period from 1972 to 1984 showed concentrations of five metals in Lake Ocoee sediments that significantly exceeded those in the Copper Basin soils (Cox, 1990). This observation indicates that erosion from exposed soils in the Copper Basin is not the only source of elevated metals in the Ocoee River watershed. Other sources of heavy metals include industrial wastewater discharges from facilities located near the town of Copper Hill (Cox, 1990; see also Figure III.A.10-4).

Due to the lack of sediment quality data for the proposed venue location, a field survey was conducted in January 1993. Analytical data for sediments collected during this survey are presented in Table III.A.10-4, along with reference values on sediment quality. The survey included four sampling locations: Ocoee No. 3 Reservoir at river mile 35 (upstream from the project site), the venue location, (river miles 26.6 and 24.4), and Lake Ocoee, at river mile 18.5.

Sediment contamination by metals in samples collected during the January 1993 survey showed a substantial change compared to previous data. In general, the recently collected samples suggest improved quality in sediments of the upstream reservoir (Ocoee No. 3). However, sediment quality at and below the venue site is low.

Low sediment quality in the two sampling sites located near the project area was indicated by high concentrations of several metals. Detected levels of copper, lead and zinc exceeded reference values for sediment quality, and in the case of copper, also surpassed the limit of tolerance indicative of potentially limiting conditions for most benthic organisms (Table III.A.10-4). Concentrations of those

metals in recently collected sediment samples were 3 to 20 times higher than levels detected in a single sample collected in 1975 at river mile 19.6 (Table III.A.10-3). Elevated metals content in sediments of the proposed venue location may be associated with sediment releases from Ocoee No. 3 Reservoir during previously conducted sluicing operations. In their current conditions, sediments in the area of the venue are not likely to support benthic communities.

Improvement in sediment sampling results at Ocoee No. 3 Reservoir in relation to historical data was indicated by a substantial decrease in concentrations of arsenic, cadmium, copper, lead, and zinc. In sediments collected during the 1993 survey, the reduction in concentration of those metals ranged from 74 percent to 94 percent in relation to the 1972-1977 data (Tables III.A.10-3 and III.A.10-4). Despite improved sediment quality in the recently collected samples, detected levels of lead, zinc, and copper in Ocoee No. 3 Reservoir remain above NYSDEC (1991) reference values. Among these three metals, copper is potentially the most limiting for development of aquatic organisms because it was present at high concentrations, exceeding the 114 mg/kg value reported as the limit of tolerance for survival of most benthic organisms (Table III.A.10-4). Improvement in sediment quality in Ocoee No. 3 Reservoir might be associated with the increased revegetation of exposed soils in the Copper Basin area, and reduced industrial wastewater discharges or covering of contaminated sediments with newly eroded soils.

Sediment quality in Lake Ocoee, downstream from the proposed venue, remains degraded. Metals content in sediments collected during the 1993 survey were very similar to those reported for the period 1973 through 1977 (Tables III.A.10-3 and III.A.10-4) and are indicative of conditions that severely hinder development of most aquatic life in the sediments.

A.11. Aquatic Resources

Several of the tributaries entering the Ocoee River between the No. 3 and No. 2 Dams support fish life, particularly Rough Creek (Little et al., 1988; Table III.A.11-1). Rough Creek also supports a diverse and relatively abundant macroinvertebrate community (Table III.A.11-2). Rock Creek was electrofished by the Tennessee Wildlife Resources Agency (TWRA) in 1990, but no fish were observed; the pH was 5.5 and the flow was high (19 cfs) due to runoff from recent rains. Only one fish species (rainbow trout) has been recorded from

Figure III A. 10-4
WATER USAGE AND STATIONING ALONG THE OCOEE RIVER

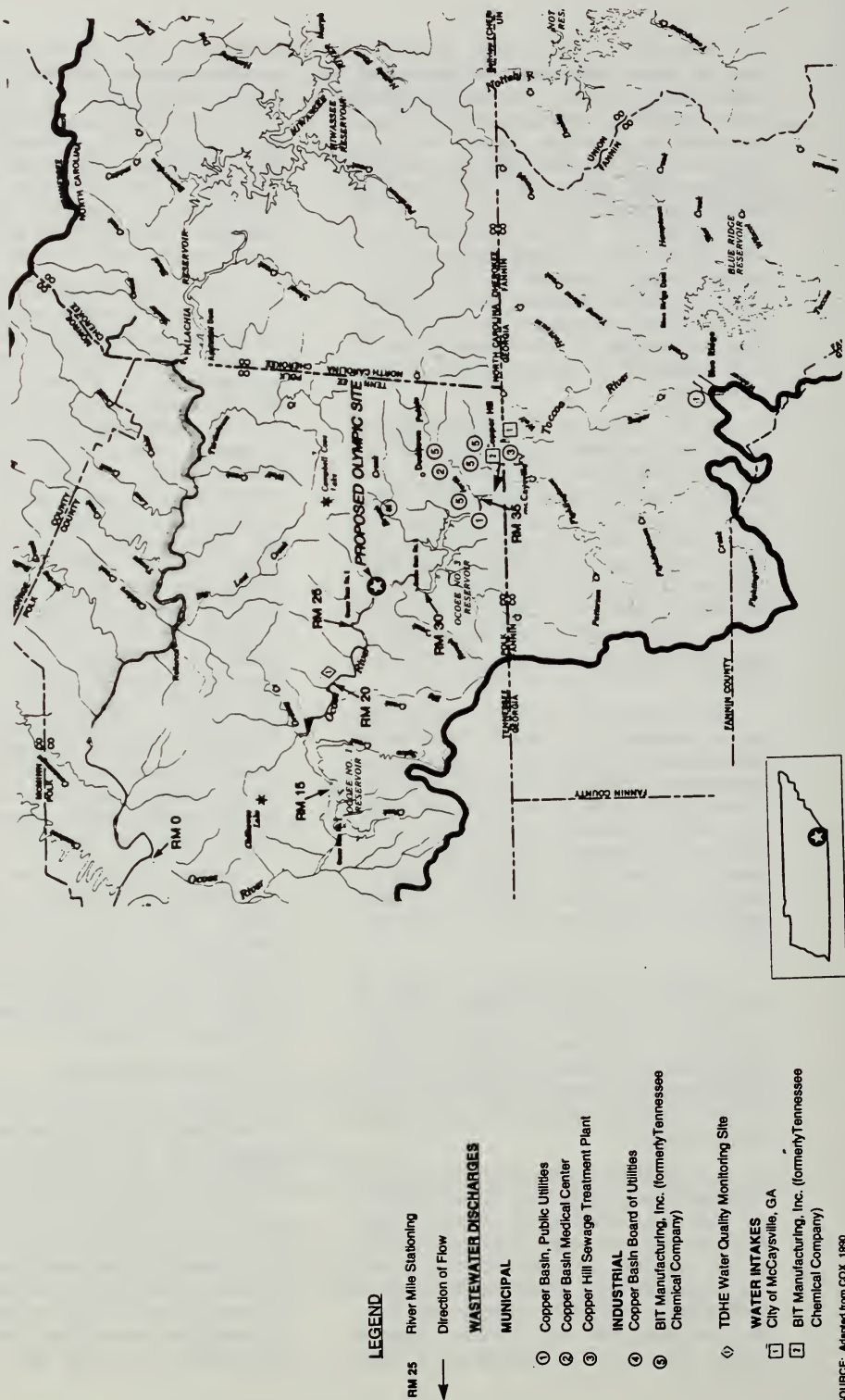


Table III.A.10-4
January 1993 Data and Reference Values for Metals
Concentrations in Sediments of the Ocoee River

Parameter (mg/kg)	Sampling Location ⁽¹⁾				Guideline Value (3)	Limit of Tolerance (4)
	Lake Ocoee (2)	Backwaters of Ocoee No. 2 Dam	Blue Hole At Venue Location	Ocoee No. 3 Reservoir		
Antimony	<37.4	<26.1	<25.3	<34.0	-	-
Arsenic	56.9	15.7	5.41	1.34	5	33
Beryllium	10.5	<0.33	<0.32	<0.42	-	-
Cadmium	8.05	2.67	<0.32	<0.42	0.8	10
Chromium	35.9	12.5	9.12	18.2	26	111
Copper	2,360	844	210	148	19	114
Lead	1,860	110	44.5	27.6	27	250
Mercury	0.475	<0.281	<0.261	<0.278	0.11	2.0
Nickel	9.88	3.75	1.27	5.86	22	90
Selenium	18.7	2.22	0.57	<0.42	-	-
Silver	4.42	1.2	0.65	0.92	-	-
Thallium	<9.36	<6.52	<6.34	<8.49	-	-
Zinc	2,760	1,660	513	292	85	800
Cyanide	0.57	<0.50	<0.50	<0.50	-	-

(1) Data from grab sediment samples collected on January 20-22, 1993. The four sampling sites were located at approximately river miles 35, 26.6, 24.4 and 18.5.

(2) TVA provided the following 1993 data for sediments in Lake Ocoee (sampling location not indicated):

Antimony	<1, mg/kg	Copper	1,500 mg/kg	Selenium	34 mg/kg
Arsenic	49g, mg/kg	Lead	1,300 mg/kg	Silver	<2 mg/kg
Cadmium	3 mg/kg	Mercury	0.27 mg/kg	Zinc	1,500 mg/kg
Chromium	44 mg/kg	Nickel	25 mg/kg		

(3) Guideline is the criteria proposed by NYSDEC (1991) for protection of sediment organisms

(4) Limit of tolerance is a concentration in the sediment that would be detrimental to the majority of benthic species (NYSDEC, 1991)

TABLE III.A.11-1
Species List For
Tributaries Of The Ocoee River

Common Name	Scientific Name
<u>Rough Creek (Below No. 3 dam)</u>	
Rainbow trout ^(b)	<i>Onchorynchus mykiss</i>
Brook trout ^(a)	<i>Salvelinus fontinalis</i>
Stoneroller ^(b)	<i>Campostoma anomalum</i>
Blacknose dace ^(b)	<i>Rhinichthys atratulus</i>
Longnose dace	<i>Rhinichthys cataractae</i>
Warpaint shiner ^(b)	<i>Luxilus coccogenis</i>
Whitetail shiner	<i>Cyprinella galactura</i>
Creek chub ^(b)	<i>Semotilus atromaculatus</i>
Greenside darter	<i>Etheostoma blennioides</i>
<u>Laurel Creek</u>	
Creek Chub ^(b)	<i>Semotilus atromaculatus</i>
<u>Rock Creek (below No. 3 dam)</u>	
Rainbow Trout	<i>Onchorynchus mykiss</i>

^a Herrig, 1993.

^b Collected during electrofishing by ID Team November 6-7, 1992.

TABLE III.A.11-2
Benthic Macroinvertebrates Collected By TWRA In Two Surber
Samples In Two Tributaries Of The Ocoee River Below No. 3 Dam

Species ^(a)	Percent of Total Number Collected
<u>Rough Creek (lower station)</u>	
Dryopidae	7.2
Ephemeraidae	7.2
Tendipedidae	4.4
Hydropsychidae	27.5
Baetidae	14.6
Heptageniidae	30.5
Gyrinidae	1.4
Corydalidae	1.4
Gomphidae	5.8
Average Number of Organisms Per Sample	34.5
<u>Rock Creek</u>	
<i>Hastaperla brevis</i>	6.4
<i>Peltoperla</i> spp.	51.1
Hydropsychidae	14.9
Heptageniidae	27.7
Average Number of Organisms Per Sample	23.5

a Rough Creek was sampled September 1988; Rock Creek was sampled November 1990. Source: Little et al. 1988 and 1990.

Rock Creek (Forest Service - CNF database). TWRA biologists speculated that the creek dries up in summer (Little et al., 1990). The benthic community in Rock Creek was less diverse and less abundant than in Rough Creek (Table III.A.11-2).

The water quality and biological productivity of the Ocoee River is also governed by low buffering capacity of the water and leaching of heavy metals from the Copper Basin. Concentrations of copper, zinc and lead often exceed criteria set by the U.S. Environmental Protection Agency (Clark, 1991; see also Section III.A.10.e, Water Quality).

The fishery in Lake Ocoee was severely depressed in the 1950s through the 1970s, and was characterized by low species diversity and extremely low biomass (Cox, 1990; Clark, 1991). Biological productivity in Lake Ocoee was believed to be depressed because of heavy metal toxicity to phytoplankton, which serves as the base of the food chain in most lentic systems. The water of Lake Ocoee is also soft, with low alkalinity and hardness, which further limits biological productivity. TVA has speculated that turbidity, hydraulic washout, and low inorganic carbon availability may also be important limiting factors at certain times (Cox, 1990).

TVA biologists sampled Lake Ocoee in 1991 using gill nets and electrofishing gear, and used the Reservoir Index of Biotic Integrity procedure (Scott, E.M. 1992) to assess the sample results. Based on the number and species of fish collected in the forebay (i.e., main basin) in addition to other parameters, a "poor" rating was assessed; 6 of 11 TVA tributary reservoir forebays were also rated as poor in 1991. The health of largemouth bass in Lake Ocoee was assessed using the TVA Fish Health Assessment Index, and that population in 1991 was rated as being in poor health. TVA sampling in 1990 revealed that channel catfish contained elevated levels (≥ 1.0 ug/g) of both selenium and polychlorinated biphenyls (PCBs) (Hall and Dycus, 1991); although the concentrations did not merit issuing fish consumption advisories, the authors suggested that fish flesh contamination in Lake Ocoee warranted further investigation.

A TWRA electrofishing survey of Lake Ocoee in 1990 revealed the presence of a relatively abundant largemouth bass population that displayed average growth, consistent recruitment, and good structure (Myhr and Copeland, 1990). TWRA biologists also observed 12 other

fish species. Coupled with the species observed by TVA and others, a total of 20 species have been observed in Parksville in recent years. According to TWRA, the fishery in Lake Ocoee has improved in the 1990s despite poor water quality and extensive sedimentation.

A.11.a. Field Surveys

Seven sites on the main channel of the Ocoee River (Figure III.A.11-1) were electrofished on November 6 and 7, 1992, using a Smith-Root® Model 15A gas-powered backpack DC electrofishing unit. Benthic invertebrate samples were collected at three of the Ocoee River sampling sites (sites 4, 6 and 7) and in three tributaries using a D-frame kick net. Representative habitats at each site that were less than 1.5 m deep were sampled (i.e., riffles, runs, shallow pools, backwater areas). Surface water temperatures ranged between 46.4°F and 50°F. At the time of sampling, flowing water was present in the Ocoee River channel due to recent, heavy rains.

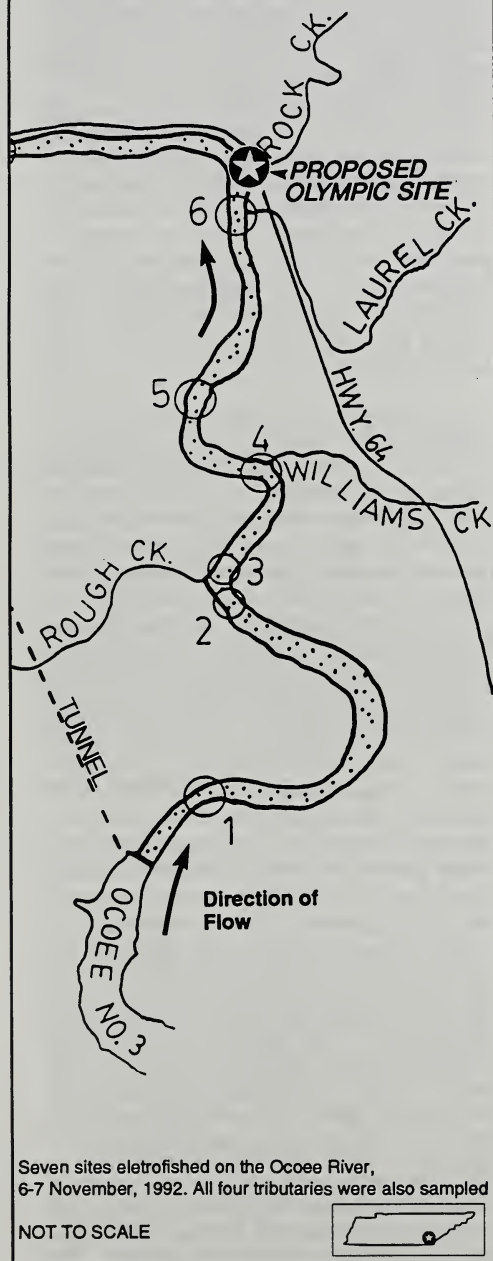
Fish communities were also sampled in the four tributaries entering the Ocoee River below the No. 3 Dam using the backpack electrofishing gear. Sampling was limited to the lower 100 m of each tributary. All four tributary streams were flowing; Rough Creek and Rock Creek had the greatest flows, and each was several yards wide at its confluence with the Ocoee. Laurel Creek and Williams Creek had much lower flows and were only a few feet wide. Recent rains contributed to the flows of all the tributary streams.

To determine whether any fish inhabited the deep pools in the Ocoee River, located between sampling sites No. 5 and No. 6, two divers surveyed approximately 150 m of river. Each diver spent approximately 45 minutes underwater looking for fish and macroinvertebrates.

A.11.b. Aquatic Fauna

Only three fish at one site (stonerollers, site No. 4) were observed while electrofishing the Ocoee River below Ocoee No. 3 Dam (Figure III.A.11-1). The fish community currently residing in the upper Ocoee River could be described as nearly non-existent. Few macroinvertebrates were observed in the upper Ocoee River below No. 3 Dam, which also reflects a severely degraded environment. Given that no fish were observed at the other sites sampled in the Ocoee River, it would appear that the stonerollers at site No. 4 were transients from Rough Creek, where five fish species were

Figure III. A. 11-1
Electrofishing Locations



observed. Four additional species have been noted in the past (Table III.A.11-1). No fish were observed by the SCUBA divers in the pools of the Ocoee River. Maximum depth was approximately 6 m, the water was very clear, and visibility was excellent. Every effort was made to locate benthic fishes (e.g., darters), as well as fish species that might inhabit midwater regions of the pools (e.g., sunfish, minnows). The conclusion that the Ocoee River below No. 3 Dam does not support viable fish or macroinvertebrate communities agrees with the findings of Cox (1990).

Viable fish populations in the Ocoee River watershed between Ocoee Nos. 2 and 3 Dams were only observed in Rough Creek and Laurel Creek. Adult and juvenile rainbow trout were collected in Rough Creek; the head waters had been stocked with this species, but not in recent years (Mayer, 1992). The occurrence of natural reproduction by trout, relatively high fish species diversity (nine species, including historical records), and invertebrate diversity (nine taxa from 1988, and one from recent ID team survey) indicate that Rough Creek is a stream with relatively high biotic integrity.

Laurel Creek supports a small population of creek chub in the lower 100 m of the stream; one common crayfish species was also collected while electrofishing. The creek chub is a common species that is generally tolerant of environmental disturbance. More fish species were expected in Laurel Creek because of the benthic community present there. The Laurel Creek benthic community was characteristic of a system with reasonable biotic integrity, given that insects were relatively abundant and the observed community (a total of five invertebrate taxa) was dominated by stoneflies and mayflies, which are comparatively intolerant of pollution.

No fish were collected in Williams Creek or Rock Creek. The benthic community in Williams Creek was sparse and was dominated by megalopterans (dobson flies), a comparatively pollutant-tolerant taxon; a total of five insect taxa were observed. The macroinvertebrate community in Rock Creek was diverse (seven taxa), relatively abundant, and was composed of stoneflies, mayflies, dipterans, and crayfish.

A.12. Wildlife

The forest community in the vicinity of the proposed project (see Appendix G-7 and Section III.A.13, Vegetation) supports a variety of wildlife species, including approximately 316 terrestrial or semi-terrestrial vertebrate species.

Selected wildlife species from various taxa that have been observed in the vicinity of the proposed site or have a high probability of occurring there, at least seasonally, include avian species such as the Carolina chickadee, tufted titmouse, golden-crowned kinglet, Carolina wren, dark-eyed junco, northern cardinal, chipping sparrow, white-throated sparrow, and various woodpeckers. Mammals include the eastern chipmunk, southern flying squirrel, gray squirrel, short-tailed shrew, and white-footed mouse. Raccoon and mink are normally associated with riparian habitats such as those that exist along the Ocoee River, and even with the low availability of aquatic food organisms, are probably present. Beaver have been observed both upstream and downstream of the proposed Olympic Venue. Reptiles with a high probability of occurrence include the eastern fence lizard, eastern box turtle, ring-necked snake, and copperhead. Amphibians with a high probability of occurrence include the American toad, spring peeper, and spotted and marbled salamanders. Eggs of the spotted salamander were observed on the Old Copper Road during field surveys. A compilation of terrestrial vertebrates reported from Polk County, along with the estimated probability that they occur in the Ocoee River gorge, is listed in Appendix G-8.

A.12.a. Management Indicator Species

An evaluation based on management indicator species (MIS) was conducted to determine the immediate and long-term effects of carrying out the proposed Olympic event (see Section IV.C.12). Based on the MIS concept, the effects the proposed Olympic project could have on entire wildlife communities can be inferred. The white-tailed deer, yellow-breasted chat, eastern bluebird, and American kestrel are selected MIS for early successional habitats; the black bear and pileated woodpecker are selected MIS for late successional habitats.

Three of the four avian MIS are associated with open environments, although each is slightly different in terms of its habitat requirements. For example, both the bluebird and kestrel need open areas with low-growing grass or forbs for foraging, and both benefit from the presence of scattered perches. Some foraging habitat is provided in the right-of-way of U.S. Highway 64. Both are also dependent on cavities (or artificial structures) for nesting, but cavity size requirements differ. The kestrel

needs an opening of approximately 7.6 cm, while the bluebird can use a cavity with an entrance of one-half that size (Hatcher, 1991). In extensive forested areas, the open habitat they require exists immediately after some forms of timber harvest, but favorable conditions are temporary. As harvested areas undergo successional changes, and tree height and density increase, habitat quality for these species declines sharply. Nearby regeneration areas [e.g., stand 3 in compartment 320 (Appendix G-7)] provide some nesting habitat. Habitat for the yellow-breasted chat is somewhat different than that for the bluebird and kestrel. Chats are associated with thickets and low brush, and can occupy regeneration areas for a considerable time following harvest (15 or more years); they do not nest in cavities. Current habitat suitability for all three of these MIS in the vicinity of the proposed site is low.

In forested habitat such as the CNF, the white-tailed deer depends heavily on regeneration areas for browse, and commonly uses them for escape and bedding areas (Forest Service, 1980). Unlike the other MIS species for early seral stages, deer rely heavily on hard mast (produced in older-aged stands) during fall and winter (Harlow and Hooper, 1971; Harlow et al., 1975). It is generally thought that deer are not able to prosper in areas where only browse is available (Forest Service, 1980), and mast is considered to be a critical component of the diet (Short, 1986). Conversely, in areas of extensive mature forest, mast production may be sufficient but forage availability may be limiting. In such instances, regeneration cuts are especially important for providing high quality, digestible forage and for mitigating the effects of periodic mast failures. Therefore, while the avian MIS for early successional areas are generally restricted to recently-created openings within the forest community, the deer makes use of, and in fact thrives in, areas in which a variety of age classes exist. Current habitat suitability for the white-tailed deer is moderate in the area of the proposed site. Given the large home range of deer (one square mile or more), adequate browse is available in the surrounding area of the CNF.

The black bear and pileated woodpecker, MIS for late successional habitats, are associated with mature stands of hardwoods. The black bear requires large expanses of forest

cover where contact with humans can be minimized. Mature stands provide mast which is essential for pre-hibernation foraging, plus den sites in hollow trees, logs, and uprooted stumps and trees (USDA, 1981). In addition to older forest stands, bears also benefit from the presence of scattered regeneration areas that furnish abundant insects, berries, green forage such as greenbriars (*Smilax* spp.), and escape cover (USDA, 1981). The area in the vicinity of the proposed project south of the Ocoee River has been designated as a black bear sanctuary. The value of the majority of habitat in the vicinity of the proposed site is low to moderate for the black bear. Hardwood poletimber and small pine sawtimber provide relatively little food or cover for this species. Some stands in the vicinity provide intermediate quantities of hard mast. Scattered regeneration areas provide some additional food and cover. The habitat value the proposed site provides is likely diminished by its proximity to U. S. Highway 64.

The pileated woodpecker is a species dependent on large snags for cavity excavation, as well as snags, logs, and stumps for foraging (Schroeder, 1983). Because the species excavates a new cavity each year (Bull, 1975), a continual supply of new snags is needed. Dense, mature forests best provide food and cover requirements. Habitat for this species in the vicinity of the proposed site is of low to moderate value. Stands on site provide little value to this woodpecker for nesting because trees have not reached sufficient size for large snags to have developed. Foraging conditions in these stands is of moderate value.

A.13. Vegetation

The CNF is comprised largely of second growth mixed hardwoods and pines (*Pinus* spp.) typical of eastern Tennessee and western North Carolina. Prior to purchase by the Federal Government, much of the forest resources in the area had been poorly managed. The typical practice was to harvest only the high quality timber; thus the residual forest came to be dominated by less desirable trees (low value species, poor growth form, etc.). In the 1960s, the Forest Service initiated a program of even-aged management designed to improve timber quality and wildlife habitat (USDA, 1986a).

For forest management purposes, the CNF is divided into compartments comprising approximately 1,000 to 2,000 acres. Each stand is periodically surveyed by trained forestry crews and assigned a forest type and management code based on species composition and domi-

nance, age class, and stocking (USDA, 1981). Forest type codes, management type codes, and stand condition classes are shown in Appendix G-7.

A.13.a. Compartments

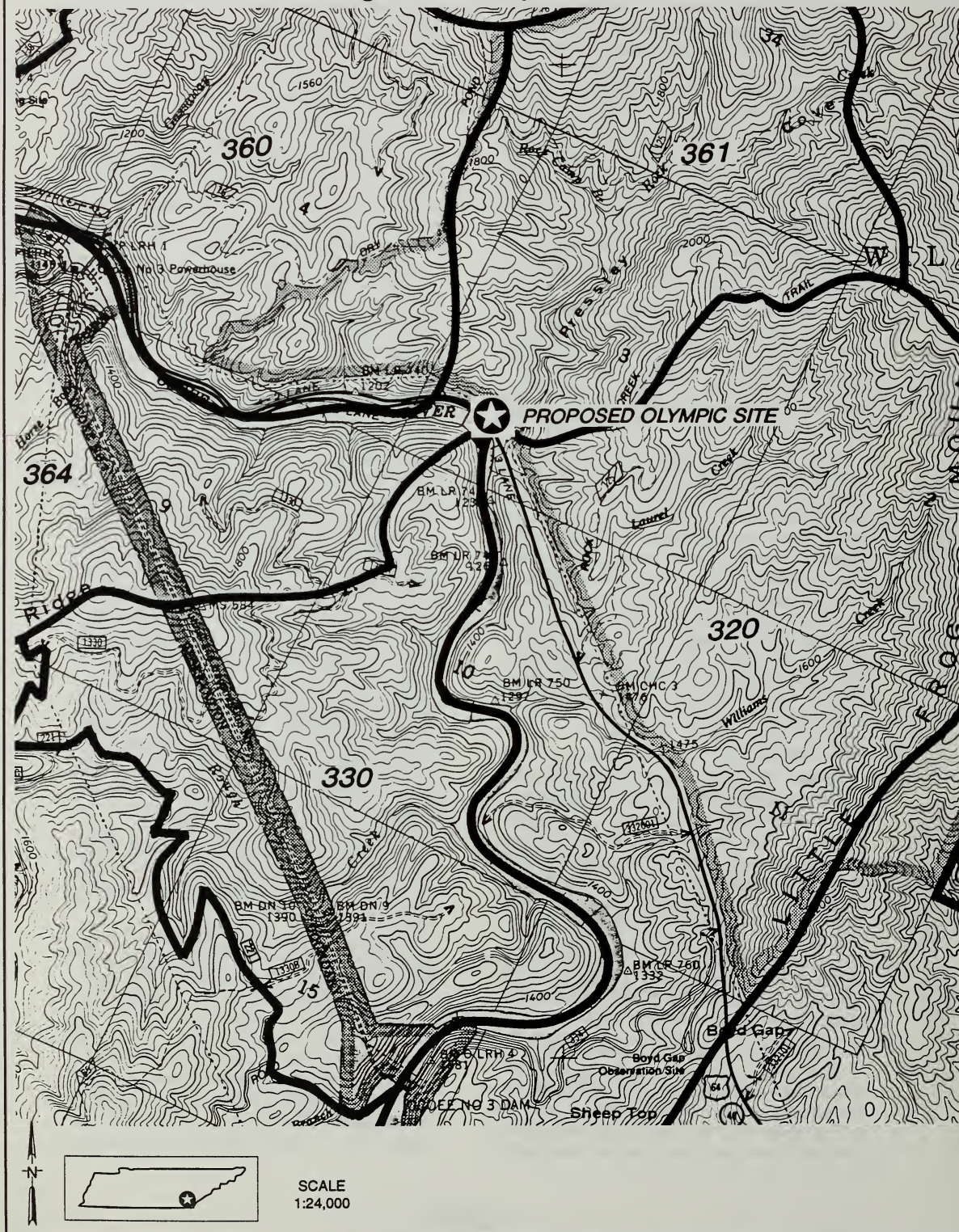
Nine compartments, comprised of from 9 to 50 individual stands each, are located in the vicinity of the proposed Olympic Venue (Figure III.A.13-1). Vegetation characteristics vary considerably according to slope and aspect. The following descriptions are summarized from the CNF, FEIS (USDA, 1986a).

Mesic slopes are dominated by white oak (*Quercus alba*), southern red oak (*Q. falcata*), post oak (*Q. stellata*), scarlet oak (*Q. coccinea*), chestnut oak (*Q. prinus*), black oak (*Q. velutina*), and hickories (*Carya* spp.). Less common trees include sourwood (*Oxydendrum arboreum*), redbud (*Cercis canadensis*), and Carolina buckthorn (*Rhamnus caroliniana*). This community is the most common forest type in the vicinity of the Ocoee River gorge. The cove hardwood forest type occurs in the moist hollows and draws; it includes such species as yellow poplar (*Liriodendron tulipifera*), white oak, and northern red oak (*Q. rubra*), black oak, hemlock (*Tsuga canadensis*), and blackgum (*Nyssa sylvatica*). Pines, particularly shortleaf pine (*Pinus echinata*) and Virginia pine (*P. virginiana*), and hardwoods such as white oak, chestnut oak, southern red oak, blackgum, and hickories occupy the dry slopes and ridges.

Rosebay rhododendron (*Rhododendron maximum*) is common along streams and lower slopes at all elevations. Mountain laurel (*Kalmia latifolia*) occurs along streams and lower slopes at lower elevations. Trees found along streamsides in the Ocoee River Gorge include black willow (*Salix nigra*), river birch (*Betula nigra*), red maple (*Acer rubrum*), sycamore (*Platanus occidentalis*), and hazel alder (*Alnus serrulata*). Shrubs and ground cover vegetation common on the CNF are summarized in the CNF, FEIS (USDA, 1986b).

Seven stands in three compartments have potential to be affected directly by construction activity associated with the proposed project. These include stands 1, 2, and 3 in compartment 320; stands 9 and 11 in compartment 330; and stands 11 and 29 in compartment 364. Compartment 320 is located on the left bank; compartments 330 and 364 are located on the right bank (Figure III.A.13-1). These components are discussed below.

Figure III. A. 13-1
Vegetative Compartments



A.13.a.1. Compartment 320

Stand 1 is an area that would be significantly affected by the proposed Olympic project. It borders the Ocoee River and includes the upper portion of the proposed course. It is composed primarily of Virginia pine in the small sawtimber stage, but also contains a minor hardwood component. A small creek dominated by vegetation associated with streambanks [e.g., mountain laurel and fetterbush (*Leucothoe axillaris*)] enters the Ocoee River in the vicinity of the existing parking area. Stand 2 is adjacent to stand 1 upstream from the proposed Olympic Venue. It is composed primarily of oaks and hickories, but also includes some Virginia pine. Huckleberry bushes (*Vaccinium* spp.) are common in the understory near the Old Copper Road. Both stands 1 and 2 are in areas that are steep and rocky. Stand 3 primarily occupies the top of the ridge between U.S. Highway 64 and the Ocoee River. It is a shortleaf pine regeneration area that has become established as the result of a wildfire that occurred in 1990 (Curruthers, 1993).

A.13.a.2. Compartment 330

Only stands 9 and 11 in this compartment would likely be affected directly by the proposed Olympic Venue. Stand 11 is adjacent to the Ocoee River in the upper part of the proposed venue site, and extends a considerable distance upstream. It is dominated by older-aged (approximately 70 years old) oaks and hickories, with pines occurring on the drier slopes; mountain laurel occurs commonly along the Ocoee River. Much of the stand 11 terrain is steep and rocky. Stand 9 is a 17-year-old regeneration area dominated by yellow poplar, white oak, and northern red oak. It occupies the upper portions of the ridge overlooking the Ocoee River and is much less steep than other stands in the compartment.

A.13.a.3. Compartment 364

Stand 29 is an immature sawtimber stand (nearly 80 years old) of oaks and hickories adjacent to the Ocoee River; most of the stand is very steep and rocky. Stand 11 also is dominated by older-age oaks and hickories. It occupies the more level upper portions of the bluff overlooking the Ocoee River. Two small streams drain through compartment 364 into the Ocoee River (Figure III.A.13-1); their banks are dominated by mountain laurel, fetterbush, and other species tolerant of moist conditions.

A.14. Threatened, Endangered, Or Sensitive Species

Information concerning threatened, endangered, or sensitive species (TES) in the region was gathered from federal and state agencies, existing reports, additional field surveys, and regional scientists with specialized knowledge of TES species in the Ocoee River ecosystem. A Biological Assessment evaluating federally listed threatened or endangered species and Biological Evaluation addressing sensitive species is provided in the Appendix I.

A.14.a. TES Plants

Nine species of TES plants [i.e., those listed either on the Federal Endangered Species List (US FWS, 1991) or the State of Tennessee Endangered Species List (TDEC, 1992a)] are known to occur in the Ocoee River Gorge. Of these, Ruth's golden aster (*Pityopsis ruthii*) is the only species that is currently federally listed as endangered. Two other species, Nevius's stonecrop (*Sedum nevii*) and Fraser loosestrife (*Lysimachia fraseri*), are candidates for federal listing, pending additional research concerning habitat and life history. Six species in the Ocoee River gorge are state listed. These species consist of chalk maple (*Acer saccharum leucoderme*), pink lady slipper or moccasin flower (*Cypripedium acaule*), bush honeysuckle (*Diervilla sessifolia* var. *rivularis*), southern lobelia (*Lobelia amoena*), Carey saxifrage (*Saxifraga careyana*), and horse sugar or sweet leaf (*Symplocos tinctoria*). Southern nodding trillium (*Trillium rugelii*), a state-listed species, was previously collected from a location near Lake Ocoee in 1980 (Shea, 1993). All of these plant species have been identified as sensitive species and are protected within the CNF.

Rare plant surveys were conducted by Oberholster and Oberholster (1992) during 1991 and 1992 of the Ocoee River gorge and by Forest Service personnel during August 1992 (Pistrang, 1992) to document the occurrence of TES plants in Forest stands adjacent to the Ocoee River gorge. The EIS ID Team members also verified known locations of rare plants. Table III-A.14-1 summarizes the number of populations of each TES plant that occurs in the Ocoee River gorge.

A.14.a.1. Ruth's Golden Aster

Ruth's golden aster is a federally endangered perennial plant that occurs on boulders adjacent to and within the channel of the lower Ocoee River gorge. It was first discovered in 1894, and apparently always has been limited to

Table III.A.14-1
Number Of Populations Of Threatened, Endangered, Or
Sensitive Plant Species Reported For The Ocoee River Gorge

Species	Current Populations ^(a)		Historical Records ^(b)	
	Below No. 2 Dam	Above No. 2 Dam	Number of Locations	Date Last Observed
Ruth's Golden Aster	6			
Nevius's Stonecrop	2		3	1956, 1977, 1980
Fraser Loosestrife	2		1	1978
Chalk Maple	5		1	1963
Pink Lady Slipper	2	1		
Bush Honeysuckle	2			
Southern Lobelia	2	2		
Carey Saxifrage	2		1	1956
Horse Sugar	1	5		
Southern Nodding Trillium			1	1980 ^(c)

- ^a Locations from rare plant survey conducted during 1991-92 (Oberholster and Oberholster, 1992) unless otherwise noted.
- ^b Historical records of populations that were last observed prior to the 1991-92 rare plant survey.
- ^c From a location near Lake Ocoee (Shea, 1993).

the Hiwassee and Ocoee River gorges in southeastern Tennessee (Gunn, 1991). The Hiwassee population is significantly larger than the Ocoee population, but both populations appear endangered by human encroachment and natural processes (e.g., successional changes) (Gunn, 1991). Ruth's golden aster was placed on the Federal Endangered Species List in 1985 (USFWS, 1991).

Ruth's golden aster only occurs in shallow soil that accumulates in cracks of large boulders exposed to direct sunlight. Many ecological characteristics of the species are not well understood, including dispersal mechanisms, germination requirements, and tolerance to flooding and shading (Gunn, 1991). Many botanists that have studied the species suspect that Ruth's golden aster requires direct sunlight and is unable to compete with other herbaceous or woody plants that become established in the same location. It may be for these reasons that the species occurs only on predominately bare boulders in river channels.

Water flow regimes in the Ocoee River have varied markedly during the past 75 years, and effects of varying flow on Ruth's golden aster are not understood. Many botanists believe that periodic flooding of the species is necessary to reduce potential competitors by removing excess soil that is needed by competing species, but not by Ruth's golden aster, which grows in very shallow soils. Although this hypothesis has been proposed by several botanists (reviewed in Gunn, 1991), it has never been proven. Periodic low-flow conditions also may be necessary for the establishment of seedlings on unoccupied boulders, but prolonged drought conditions probably result in plant mortality, especially among seedlings. No documentation exists that current Ocoee River water management has any effect upon Ruth's golden aster (Gunn, 1991).

Ruth's golden aster is known from six different locations in the Ocoee River gorge. Three different rare plant surveys were conducted during 1992 and 1993 (Oberholster and Oberholster, 1992; Pistrang, 1992) and no other Ocoee River populations of Ruth's golden aster were located. Intensive surveys specifically for Ruth's golden aster also were conducted in 1977 and 1985 (Gunn, 1991). All of these surveys indicated that all populations on the river currently occur downstream from Ocoee Dam No. 2. The species does not occur in the locale of the proposed Olympic site, nor in potential effect areas upstream from the site.

A.14.a.2. Nevius's Stonecrop

Nevius's stonecrop is a very small, succulent herb that occurs in scattered locations in the southeastern United States. Nevius's stonecrop is currently a candidate for federal listing, and it is listed by the State as endangered (TDEC, 1992a). The species is very fragile and is easily uprooted and destroyed. It grows primarily on small ledges on the side of steep bluffs and consequently, few humans come into contact with the species. The plant is unobtrusive and difficult to see.

Two populations of Nevius's stonecrop were recently located in the Ocoee River gorge. Both populations occur below Ocoee Dam No. 2 on bluffs adjacent to Highway 64. Although three additional populations were previously reported from the Ocoee River Gorge, none of these have been observed since (Oberholster and Oberholster, 1992).

A.14.a.3. Fraser Loosestrife

Fraser loosestrife is a relatively tall (up to 2 m), perennial herb that occurs in scattered locations in the southern Appalachian Mountains. Fraser loosestrife is currently a candidate for federal listing, and it is listed as endangered by TWRA (TDEC, 1992a). Fraser loosestrife occurs primarily in meadows, along moist flats adjacent to streams, and on moist roadside banks (Godfrey and Wooten, 1981).

Two populations of Fraser loosestrife were located in the Ocoee River gorge during recent rare-plant surveys (Oberholster and Oberholster, 1992). Both populations are located downstream from Ocoee Dam No. 2 in woodlands adjacent to U.S. Highway 64. A third population last reported in 1978, has not been observed since (Oberholster and Oberholster, 1992).

A.14.a.4. Chalk Maple

Chalk maple is a small variety of sugar maple that occurs primarily in the Piedmont Region of the southeastern United States. Chalk maple is not federally listed, but it is listed as a special concern species by TWRA (TDEC, 1992a). Chalk maple occurs primarily in bottomlands, and it is relatively uncommon throughout most of its range (Petrides, 1988).

Five populations of chalk maple were located in the Ocoee River Gorge during the rare plant survey conducted in 1991 and 1992. All five populations occur in moist woodlands, downstream from Ocoee Dam No. 2. A population of chalk maple also was reported for a location at the lower end of the proposed project

site, but it was last observed in 1963 (Oberholster and Oberholster, 1992). Recent searches specifically for this population resulted in concluding that it is no longer present at site (Oberholster and Oberholster, 1992; surveys conducted in preparation of this EIS).

A.14.a.5. Pink Lady Slipper or Moccasin Flower

Pink lady slipper is a perennial herb that occurs in scattered locations throughout the eastern United States. It is a well-known member of the orchid family, and is often collected by wildflower enthusiasts. Pink lady slipper is listed as endangered by TWRA (TDEC, 1992a) because of declining populations associated with over-collecting.

Three populations of pink lady slipper were located in the Ocoee River gorge during a recent rare plant survey (Oberholster and Oberholster, 1992). Two of these populations are located in low-lying woods between the Ocoee River and U.S. Highway 64, downstream from Ocoee Dam No. 2, but the third population consists of a few scattered plants that occur in the immediate-effect zone of the proposed project site.

A fourth population was located by Pistrang (1992) 1.5 miles from the proposed project site in a forest stand characterized by dry ridgetops and deeply incised ravines and creek bottoms. This stand is described as occurring on slopes that are too steep for development and in bottoms that are densely vegetated with rhododendron (*Rhododendron maximum*) thickets.

A.14.a.6. Bush Honeysuckle

Bush honeysuckle is a deciduous shrub that occurs in scattered locations in southeastern Tennessee and in adjacent states. It is listed as threatened by TWRA (TDEC, 1992a). Two populations of bush honeysuckle were located in the Ocoee River Gorge during the rare plant survey conducted in 1991-1992 (Oberholster and Oberholster, 1992). Both populations consist of scattered individuals occurring in moist woodlands between the Ocoee River and Highway 64, below Ocoee Dam No. 2.

A.14.a.7. Southern Lobelia

Southern lobelia is a small herbaceous plant that is listed as being of special concern by TDEC (1992a). It occurs primarily on seepage slopes and along wet woodland borders of southeastern Tennessee and nearby states (Godfrey and Wooten, 1981). It is classified as

an obligate wetland plant by the USFWS, meaning that under natural conditions it occurs more than 99 percent of the time in wetlands (Reed, 1988).

Four populations of southern lobelia were located in the Ocoee River gorge during a recent rare plant survey (Oberholster and Oberholster, 1992). Of these, two populations occur along the river bank, downstream from Ocoee Dam No. 2. The other two populations occur on small seepage wetlands that are located at the upper end of the immediate-effect zone of the proposed project site.

A.14.a.8. Carey Saxifrage

Carey saxifrage is a small, rosette-forming perennial herb that occurs in mountainous regions of western North Carolina, eastern Tennessee, and surrounding states. This plant is easily confused with more common species of the genera that occur in the same or similar habitats, and it can only be distinguished when in flower or fruit (i.e., during May through August). Carey saxifrage is listed as a special concern species by TWRA (TDEC, 1992a). Carey saxifrage occurs on moist rocky slopes, moist outcrops of acidic rocks, and along streambanks (Oberholster and Oberholster, 1992). The population in the Ocoee River gorge occurs on rocky bluffs in habitats similar to those in which Nevius's stonecrop occurs. Two populations of Carey saxifrage were recently located in the Ocoee River gorge. Both populations occur on bluffs adjacent to U.S. Highway 64, below Ocoee Dam No. 2. Another population of the species was last reported in 1956 (Oberholster and Oberholster, 1992).

A.14.a.9. Horse Sugar or Sweet Leaf

Horse sugar is a semi-evergreen shrub that is listed as being of special concern by TWRA (TDEC, 1992a). Horse sugar occurs throughout the eastern United States, and it is fairly common in some portions of its range (Petrides, 1988), but it is relatively rare in Tennessee (Oberholster and Oberholster, 1992).

Six populations of horse sugar were located in the Ocoee River gorge during the recent rare plant survey (Oberholster and Oberholster, 1992). All but one of these are located upstream from Ocoee Dam No. 2. Three populations occur in woodlands adjacent to the Ocoee River, upstream from the proposed project site, and two populations occur in or adjacent to the proposed project site. Pistrang (1992) located at least nine other populations of horse sugar at scattered locations along ridgetops and

side slopes of woodlands adjacent to the Ocoee River near the proposed project site.

A.14.a.10. Southern Nodding Trillium

The southern nodding trillium is a perennial herb that grows in moist, rocky soils in scattered locations throughout the United States. It is relatively uncommon throughout its range, and it is listed as endangered by TWRA (TDEC, 1992a), and as a sensitive species by the Forest Service. The species was collected in 1980 from a location near Lake Ocoee (Shea, 1993), but it has not been observed elsewhere in the Ocoee River gorge.

A.14.b. TES Wildlife

Although few species of animals on the USFWS (1991) Endangered Species List are known to occur in the Ocoee River gorge, several species considered sensitive by the Forest Service and TWRA (TDEC, 1992b) have been reported from the gorge. Several other sensitive species have been reported from surrounding areas (i.e., Polk County), and could possibly occur in the gorge but have never been reported. Many animals are highly mobile and secretive, and the degree of certainty regarding the presence or absence of TES animals is often less than that for TES plant species. Following is a discussion of TES wildlife species that may occur in the Ocoee River gorge, general habitat requirements of each, and the likelihood of their occurrence at the proposed Olympic site.

A.14.b.1. Red-Cockaded Woodpecker

The red-cockaded woodpecker (*Picoides borealis*) (RCW) is a small, uncommon species endemic to southern pine forests. The RCW is found in scattered locations throughout the Southeastern United States and listed as endangered by the USFWS (1991). The RCW somewhat resembles the related hairy (*P. villosus*) and downy (*P. pubescens*) woodpeckers, but is readily distinguished by its barred back, large white cheek patches, and raspy or nasal calls. The RCW is unusual among woodpeckers in that it has a well-developed social structure and lives in groups of up to nine birds referred to as clans (Hooper et al., 1980).

RCWs are extremely specialized, requiring old-growth stands of yellow pines, i.e., longleaf pine (*P. palustris*), loblolly pine (*P. taeda*), slash pine (*P. ellioti*), shortleaf pine, and Virginia pine. Unlike other woodpeckers, RCWs excavate their nesting cavities in living pine trees. Typically, although not always, these trees are infected with a heartwood-decay-

ing fungus (*Phellinus pini*) (Jackson, 1977) which does not develop until trees reach older age classes. Average age of trees used for cavity construction varies among species, but is usually 75 years or more (Hooper et al., 1980). The Forest Service conservatively considers 60 years to be the minimum age at which a stand is likely to support a RCW clan (50 years for Virginia pine) (Henry, 1989).

Historically the RCW occurred throughout much of Tennessee (Nicholson, 1977), but due to loss of old-growth pine habitat, populations have declined sharply. The Forest Service has conducted extensive ground surveys for the RCW on the CNF, but to date, only one colony has been located. The site is on Lake Ocoee several miles downstream from the proposed Olympic Venue. The colony is now inhabited by a single individual, a male known to be at least 4 years old (Boyd, 1992). Attempts to introduce a female RCW to enhance the prospects of the colony's survival have to date failed (Herrig, 1992). The CNF colony is the last known RCW colony in the state (Durham, 1992).

As of late 1992, only a few stands in the vicinity of the proposed Olympic Venue site with potential to provide suitable RCW habitat had not been systematically surveyed. Seven stands within 2.5 miles of the proposed Olympic Venue site were surveyed. More distant stands were assumed to be secure from potential effects of the proposed project based on a foraging distance of approximately 0.5 mile for the species (Henry, 1989). Surveys for active, abandoned, or incipient RCW colony sites were conducted on January 15, 16, and 27, 1993, following guidelines established by the Forest Service (Henry, 1989). Four-person crews systematically walked transect lines through pine stands, spacing themselves such that all pine trees were examined. Trees on which evidence of woodpecker activity was detected were carefully examined to determine if RCWs were present. RCW cavities are distinctive due to the fact that trees are alive and resin flows stain the area around the cavity excavation (Henry, 1989).

No RCWs or trees excavated by RCWs were found during the survey. A few trees exhibited noticeable white resin stains, but closer inspection with binoculars revealed that, in all cases, the drilling had been done by yellow-bellied sapsuckers (*Sphyrapicus varius*). No sapsuckers were actually observed but hairy, downy, pileated (*Dryocopus pileatus*), and red-bellied (*Melanerpes carolinus*) woodpeckers

were seen during the survey. Stand 6 in compartment 361 supported a noticeably large number of woodpeckers.

Portions of some surveyed stands exhibited the characteristics favored by RCWs for colony sites (i.e., large diameter trees and open mid-story), but most areas did not appear to be acceptable habitat because of the density and height of the midstory. Lack of available foraging habitat (approximately 30-year or older pine and pine-hardwood stands), also may limit the suitability of these stands for RCWs. Sufficient foraging habitat (often several hundred acres) must be contiguous and within 0.5 mile of a colony site (Henry, 1989).

A.14.b.2. Grasshopper Sparrow

The grasshopper sparrow (*Ammodramus* *savannarum*) is a small, flat-headed bird with buffy sides and breast. The grasshopper sparrow is listed as threatened by TWRA (TDEC, 1992b). Juveniles have streaked breasts and are somewhat similar to Henslow's sparrow (*Ammodramus henslowii*) (Peterson, 1980). The species is associated with open habitats such as grasslands, pastures, weedy meadows, and hay fields (Alsop, 1980). Grasshopper sparrows are secretive, but can be identified readily by their weak flight and distinctive dry, buzzy song that resembles a grasshopper call.

The grasshopper sparrow has been reported in Polk County (TDEC, 1992b), but is not expected to be in the proposed project area due to the unavailability of suitable habitat. The nearest location in which grasshopper sparrows would likely be found is approximately 5 miles away, in the Copper Hill area.

A.14.b.3. Osprey

The osprey (*Pandion halaetus*) is a large, dark-brown and white raptor that feeds primarily on fish. It feeds by hovering to locate its prey, then plunging feet-first into the water to seize the fish with its talons. Ospreys are associated with large aquatic areas such as rivers, lakes, and reservoirs with abundant fish. The osprey is listed as endangered by TWRA (TDEC, 1992b).

Ospreys have been reported in Polk County (TDEC, 1992b), but are not expected to occur in the proposed project area because of the shallow, rocky nature of the Ocoee River and an almost complete lack of a forage base. Ospreys are much more likely to occur both upstream and downstream in the impounded Ocoee reservoirs.

A.14.b.4. Bald Eagle

The adult bald eagle (*Haliaeetus leucocephalus*) is a large raptor with a dark body and white head and tail. Those less than 4 to 5 years of age are dark and lack the white head and tail. Bald eagles once occurred commonly throughout North America, but their numbers declined dramatically in recent years because of indiscriminate killing and reproductive problems associated with widespread use of pesticides (Green, 1985). The bald eagle is listed as endangered throughout the southeastern United States by the USFWS (1989). Reintroduction attempts through hacking programs (i.e., capturing young eagles, raising them in other locations, and releasing them once they are able to fly) were initiated during the mid-1970s, and these programs have restored bald eagles to much of their former breeding range (Green, 1985). Preferred bald eagle habitat in Tennessee consists of reservoirs and other large bodies of water that support adequate fish populations, their primary food source (Alsop, 1980). Bald eagles congregate in large numbers in some locations during winter, and apparently are not excessively disturbed by human activity. However, nesting eagles usually require isolated areas and often desert nests if disturbed even slightly (Alsop, 1980). Eagles that have been raised in captivity often exhibit more tolerance to human disturbance, and sometimes nest successfully in areas with much human activity (Hatcher, 1993).

The bald eagle program in Tennessee was initiated in 1980. A total of 230 eagles have been hacked in the state since 1980, including 43 at Chickamauga Reservoir, the hacking site nearest to the proposed Olympic site (approximately 35 miles away). Bald eagles have nested successfully at Tellico Reservoir, 40 to 50 miles from the proposed Olympic site, during the last 3 to 4 years. No eagle nests have been reported from the Ocoee River gorge, but a single eagle has wintered on Lake Ocoee during the past few winters (Hatcher, 1993).

A.14.b.5. Green Anole

The green anole (*Anolis carolinensis*) is a small to medium-sized lizard sometimes referred to as a "chameleon" because of its ability to change colors. Anoles may appear green, brown, or gray, depending on activity, stages of excitement, the surroundings, and possibly other factors (Mount, 1975). Males are easily identified by their brightly colored throat "fans."

The green anole is largely arboreal and does not appear to be extremely selective of habitat other than requiring areas with abundant vegetation and shade (Mount, 1975). Echternacht (1980) noted that the species spends a substantial amount of time on trees, shrubs, vines, and low vegetation. The green anole is found throughout the southern United States, ranging from Texas across the Gulf States to the Carolinas. The species has a poorly developed hibernating instinct, and is therefore susceptible to freezing (Mount, 1975). The green anole is common elsewhere in its range, but it is rare in Tennessee. It is listed as "Deemed in Need of Management" by TWRA (TDEC, 1992b).

Anoles occur throughout the southeast and are observed infrequently in the extreme southern counties of Tennessee (Echternacht, 1980). The species has been reported at up to 1,800-foot elevation in Tennessee. Anoles were not observed during field visits to the proposed venue site, but the probability of their detection was low because most field work took place during cool to cold periods of the year. Prior to 1993, green anoles had been reported from the Ocoee River gorge on three occasions, but the last observation occurred in 1964, approximately 8 river miles downstream from the proposed Olympic site (TDEC, 1988b). Several individuals of the species were observed in the spring of 1993 in the area of the proposed venue (Lamb, 1993).

A.14.b.6. Six-Lined Racerunner

The six-lined racerunner (*Cnemidophorus sexlineatus*) is a medium-sized lizard, attaining a maximum length of 9.5 inches. It is characterized by its extremely long tail and active, nervous, prowling behavior (Echternacht, 1980). The six-lined racerunner is common elsewhere in its range, but is rare in Tennessee. It is listed as "Deemed in Need of Management" by TWRA (TDEC, 1992b).

The species is found in a variety of habitats, including fields, road rights-of-way, barren waste areas (Mount, 1975), open woods, and rock outcrops (Echternacht, 1980). Optimum habitat includes dry, well-drained areas with loose and/or sandy soil to facilitate burrowing (Echternacht, 1980; Combs, 1992).

The six-lined racerunner is widespread throughout the southeastern United States, with its range extending westward nearly to the Rocky Mountains (Mount, 1975). The species is most abundant in the Coastal Plain. In

Tennessee, as throughout much of its range, its distribution is spotty. Six-lined racerunners have been reported from Polk County (TDEC, 1992b), but only one sighting in the Ocoee River gorge has been documented, an observation in 1900 from a location 8.5 river miles downstream from the proposed Olympic site (TDEC, 1988b). It is possible, although unlikely, that a few individuals could be present at or near the proposed Olympic site.

A.14.b.7. Northern Pine Snake

The northern pine snake (*Pituophis melanoleucus melanoleucus*) is a large, thick-bodied snake that may attain lengths of nearly 7 feet. Northern pine snakes are gray, cream, or yellow, with distinctive dark brown to black, saddle-shaped markings on the sides and back (Mount, 1975). In Tennessee, northern pine snakes have been reported to occur in sandy pine woods and on dry mountain ridges. The species is most abundant below 500-foot elevation, but northern pine snakes have been reported in areas up to 2,000 feet above MSL (Echternacht, 1980). Northern pine snakes have an inherent tendency to hide, often taking refuge in burrows, cavities, or underneath vegetation (Conant, 1956).

The northern pine snake is uncommon throughout its range, and it is a candidate species for federal listing (USFWS, 1991). Northern pine snakes have not been reported at the site of the proposed Olympic event (TDEC, 1988b). Their preference for sandy areas would suggest that other portions of Polk County would be more favorable for northern pine snakes, and the probability of the species occurring in the proposed project area is low.

A.14.b.8. Southern Water Shrew, Star-Nosed Mole, New England Cottontail, and Carolina Northern Flying Squirrel

The southern water shrew (*Sorex palustris punctulatus*), star-nosed mole (*Condylura cristata*), New England cottontail (*Sylvilagus transitionalis*), and Carolina northern flying squirrel (*Glaucomys sabrinus coloratus*) are considered sensitive species by the Forest Service and have been reported in Polk County (TDEC, 1992b). However, all of these are northern species that occur in Tennessee only at high elevations (usually above 3,000 feet) (Kennedy and Harvey, 1980), and none have been reported from the Ocoee River gorge. The Carolina northern flying squirrel is listed as endangered by the USFWS (1991), whereas the southern water shrew and New England cottontail are

candidate species for federal listing. The star-nosed mole is listed as "Deemed in Need of Management" by TWRA (TDEC, 1992b).

A.14.b.9. Hairy-Tailed Mole

The hairy-tailed mole (*Parascalops breweri*) is a small burrowing mammal that is considered sensitive and is protected within CNF. It is listed as "Deemed in Need of Management" by TWRA (TDEC, 1992b), but it is neither listed nor a candidate for listing by the USFWS (1991). The hairy-tailed mole is primarily a northern species that occurs mostly at high elevations (above 3,000 feet) in Tennessee, but it has been collected at lower elevations in Great Smoky Mountains National Park (Kennedy and Harvey, 1980). The species has never been reported from the Ocoee River Gorge.

A.14.b.10. Rafinesque's Big-Eared Bat

Rafinesque's big-eared bat (*Plecotus rafinesqueii*) is a medium-sized bat with extremely long ears that occurs in scattered forested areas throughout Tennessee. The species is uncommon in the state, and it is a candidate for federal listing by the USFWS (1991). It feeds on insects at night and roosts by day in partially lighted, unoccupied buildings and other manmade structures (Kennedy and Harvey, 1980). The species has never been reported from the Ocoee River gorge.

A.14.b.11. Least Weasel

The least weasel (*Mustela nivalis*) is primarily a northern species that occurs most often at high elevations (above 3,000 feet) in Tennessee, although a few have been observed at lower elevations (Kennedy and Harvey, 1980). The species is rare over most of its North American range, and it is considered sensitive by the Regional Forester and protected in the CNF. The species is listed as a special-concern species by TWRA (TDEC, 1992b). Although least weasels occur in a variety of habitats, including forest and pastures, they are most commonly found in wet areas with a dense growth of low herbaceous plants (Kennedy and Harvey, 1980). The least weasel has never been reported from the Ocoee River gorge.

A.14.b.12. Tennessee Dace

The Tennessee dace (*Phoxinus tennesseensis*) is a small fish that occurs in low-gradient streams entering the north side of Lake Ocoee. The species does not occur in the Ocoee River above the lake, and is not present in the tributaries in or near the proposed Olympic site. It was first described in 1988, and little is

known about its distribution and habitat requirements. The species has been designated as "Deemed in Need of Management" by TWRA (TDEC, 1992b). It is considered a sensitive species and is protected within the CNF. The Tennessee dace is neither listed nor a candidate for listing by the USFWS (1991).

A.14.b.13. Snail Darter

The snail darter (*Percina tanasi*) is a small fish that was reportedly collected by TVA biologists in the Ocoee River downstream of Lake Ocoee Dam at approximately river mile 5.8. This species is listed as threatened by the USFWS (USFWS, 1992). The species has not been recorded from anywhere else on the Ocoee River including the proposed site. This snail darter is known to live in gravel shoals.

A.14.b.14. Ocoee Covert Snail

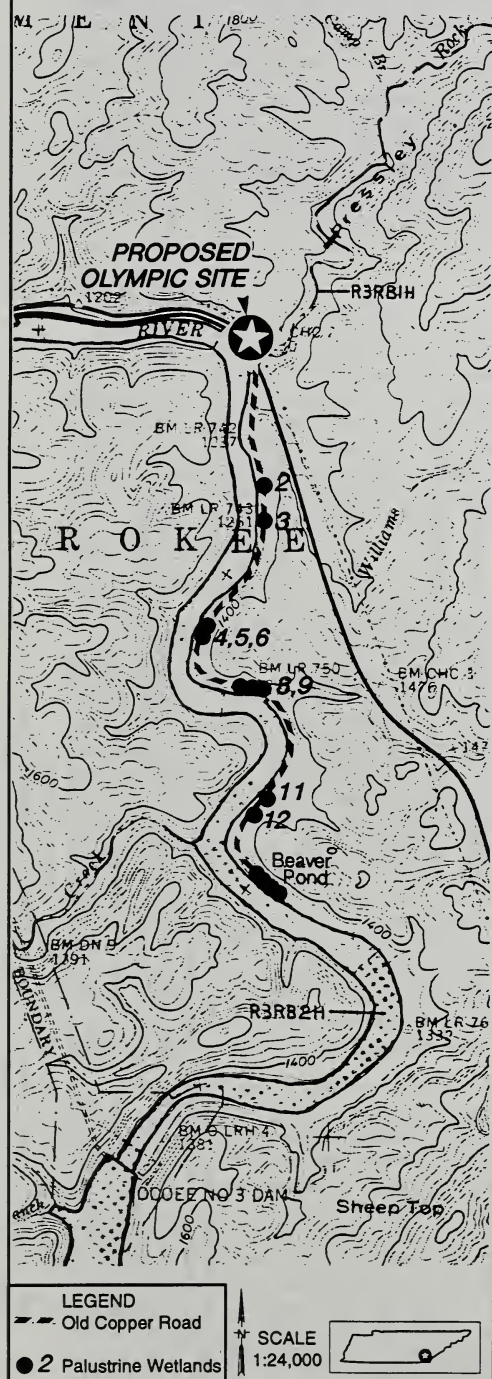
The Ocoee covert snail (*Mesodon archeri*), also known as the Goforth Creek snail, is a terrestrial species that was once known only from the area around Goforth Creek, a small tributary of the Ocoee River (Bogan and Parmalee, 1983). Recently, a large population was discovered along the hills lining Little Gasaway Creek, on the south side of the Ocoee River near power house No. 3 (Biggins, 1992). The Ocoee covert snail is currently listed as "Special Concern" by TWRA (TDEC, 1992b).

A.15. Wetlands

Large wetlands associated with the Ocoee River were identified by examination of the National Wetland Inventory (NWI) map of the area produced by the USFWS (1991). Wetlands in the immediate locale of the proposed project site that did not appear on the NWI map were delineated and mapped during November and December 1992, using procedures outlined in the *Wetland Delineation Manual* (WDM) (U. S. Army Corps of Engineers, 1987) (Figure III.A.15-1). Field delineation procedures consisted of the identification of hydric soils, hydrophytic vegetation, and hydrologic features at each potential wetland site. Sites that were examined were classified as wetlands if field indicators of all three criteria were present. Wetlands that were not included on the NWI map were classified using the system of Cowardin et al., (1979).

The NWI map indicated the presence of two different types of wetlands in the area surrounding the proposed Olympic Venue site. The Ocoee River channel and most of the larger tributaries of the river appear on the NWI map

Figure III. A. 15-1
Location of Wetlands



as riverine wetlands (i.e., categories R3RB2H and R3RB1H). These wetlands as well as others observed during field investigations are characterized in Table III.A.15-1.

Nine small palustrine wetlands that do not appear on the NWI map were located along the Old Copper Road upstream from the proposed project site. Vehicular traffic along the Old Copper Road has resulted in deep rutting in many locations, contributing to creation and/or expansion of these small wetlands. Most of the wetlands are ponded or saturated areas dominated by herbaceous vegetation; they appear to have been formed by groundwater seeps that occur at the base of the slope above the Old Copper Road. Most are confined primarily to the roadbed, and all exhibit required characteristics (i.e., hydric soil, hydrophytes, and wetland hydrology) to be considered wetlands. All but two of these wetlands are classified as palustrine, emergent, or persistent (PEM1C or PEM1A) (Cowardin et al., 1979). Site 8 and the lower section of Site 9 are classified as palustrine, forested, broad-leaved deciduous (PFO1C).

The largest palustrine wetland on the Old Copper Road is a recently created beaver (*Castor canadensis*) pond that occurs at the location where a powerline runs directly uphill away from the Ocoee River, toward U.S. Highway 64. This site is approximately 1.6 river miles upstream from the parking lot located at the upper end of the proposed project site. A wetland may have occurred at the site before modification by beaver activity, but damming undoubtedly increased the size of the wetland and modified its hydrology. The beaver pond is approximately 150 yards long and 65 yards wide. Indications that beavers are still actively using the site were not observed, but the dam was in good repair, indicating that this wetland is likely to exist well into the future. The beaver pond is classified as palustrine, forested, broad-leaved deciduous (PFO1H), but it is converting to palustrine, forested, dead (PFO5C) (Cowardin et al., 1979) as standing timber dies from continued inundation.

Another forested wetland (PFO4A), approximately 100 yards wide and 300 yards long, that does not appear on the NWI map is located approximately 1.5 river miles downstream from the proposed project site near Rogers Branch. The site is a depositional bar with a natural levee and ridge and swale topography. Low areas are technically wetlands, but higher portions are not. Virginia pine dominates the overstory of the dry locations of this site, but recent beaver

TABLE III.A.15-1
Location and Description of Wetlands That May Potentially Be Affected By The Proposed Olympic Venue

Wetland ^a	Distance From Parking Lot (mi.) ^b	Size (yd.)	General Description	Wetland Classification
Ocoee River	--	≈70 across	Rock-bottomed river with large boulders	R3RB2H
Tributaries (7)	0.1 - 1.0	≈10 across	Small, rock-bottomed streams	R3RB1H
Site 2	0.34	19.5 X 4	Rutted area on Old Copper Road (OCR)	PEM1A
Site 3	0.42	49 X 5.5	Seepage area and intermittent stream on OCR	PEM1C
Site 4	0.74	42 X 2	Rutted, seepage area on OCR	PEM1C
Site 5	0.78	19.5 X 2	Somewhat wet area on OCR	PEM1A
Site 6	0.80	65.5 X 2	Rutted area on OCR with intermittent stream	PEM1C
Site 8	0.98	17.5 X 16	Wooded wetland between OCR and Ocoee River	PFO1C
Site 9 (lower)	1.00	27.5 X 19	Wooded wetland between OCR and Ocoee River	PFO1C
Site 9 (upper)	1.02	27.5 X 3.5	Rutted, seepage area on OCR	PEM1C
Site 11	1.33	13 X 13	Seepage area on OCR and adjacent low areas	PEM1C
Site 12	1.39	70 X 2	Rutted area on OCR	PEM1A
Beaver Pond	1.64	150 X 65	Beaver pond on OCR in which trees are dying	PFO1H
Rogers Branch	1.50	300 X 100	Depositional bar adjacent to Ocoee River	PFO4A

^a Site names refer to field notes only and are numbered consecutively.

^b Distances of wetlands along Old Copper Road estimated by counting powerline poles and converting number of poles between wetlands to distances as measured on U.S. Geologic Survey maps. Parking lot is located at the base of a steep hill, at the location where Highway 64 parts from the Ocoee River.

^c PEM1A = Palustrine, Emergent, Persistent, Temporarily Flooded
PEM1C = Palustrine, Emergent, Persistent, Seasonally Flooded
PFO1H = Palustrine, Forested, Broad-leaved Deciduous, Permanently Flooded
PFO4A = Palustrine, Forested, Needle-leaved Evergreen, Temporarily Flooded
R3RB1H = Riverine, Upper Perennial, Rock Bottom, Bedrock, Permanently Flooded
R3RB2H = Riverine, Upper Perennial, Rock Bottom, Boulder, Permanently Flooded

ver feeding activity is girdling most of the larger trees. Site characteristics are expected to change significantly in the next few years.

A.16. Cultural Resources

An inventory of cultural resources within the proposed Olympic Venue locale was conducted by the EIS ID Team. The assessment of baseline conditions consisted of an archaeological survey of areas not previously surveyed, as well as revisitation of previously identified archaeological sites in the vicinity.

A.16.a. Historic Overview

A generalized overview of the prehistory and history of the region is provided in this section, as well as a known cultural chronology and an assessment of the potential for archaeological sites within the proposed Olympic Venue site. Much of this information was based upon the works of Bass, 1976; Coe, 1964; Caldwell, 1958; Richie, 1956; Gardner, 1974; Haynes, 1987; Willey, 1966; Keel, 1976; Dickens, 1976; and Barclay, 1946.

A.16.a.1. Prehistory

The earliest prehistoric cultural occupation in the United States is known as the Paleoindian Period, ranging from 10,000 to 8,000 before present (B.P.). Artifacts representative of this period include finely crafted lanceolate projectile points and crescentric knives. Due to the age of Paleoindian sites and the concomitant landscape changes resulting from tectonic, climatic, erosional, and human landscape modifications, little is known about the land use and settlement patterns employed during this period. Most sites dating from this period are associated with ridgetops, hillsides, river terraces, and the margins of playas or lakes. Within the ROI Paleoindian evidence, particularly Clovis, are limited to isolated surface finds, and therefore are not datable. However, evidence of this type have been discovered within the project area.

The PaleoIndian Period (10,000 - 8,000 B.C.) was followed by the Archaic Period in the eastern United States. The Archaic Period represents a change from Pleistocene climatic conditions to a more modern conditions, and the human response to those changes. These changes are evidenced by increasing number and diversity of habitation sites and activities, reflected in tool assemblages used by inhabitants to exploit more varied habitats. Due to the length of time covered by this period, it is divided into three sub-periods; the Early Archaic, Middle Archaic, and Late Archaic, each of

which is recognized by changes in material assemblages employed across broad areas.

Artifacts exclusively associated with the Early Archaic Period (8,000 - 5,000 B.C.) include a series of corner-notched, side-notched, and later, bifurcate-base projectile points. This period can be described as the developmental stage of an economy based on exploiting a variety of seasonally occurring resources. Early Archaic sites have not been recorded in the vicinity of the proposed Olympic Venue, but are known for the general region.

In the Middle Archaic Period (5,000 - 2,000 B.C.) tool assemblages were more diversified. Site locations appear to occur in a wider variety of habitats, suggesting a larger number of resource extraction techniques coupled with a broader spectrum of hunting and gathering activities that provided a more varied diet. No Middle Archaic sites have been conclusively identified in the project area, but are known for the region.

Late Archaic Period sites date between 2,000 and 800 B.C., when climatic changes resulted in cooler, moister regional conditions. This shift is accompanied by development of plant cultivation and ceramics manufacture in the eastern United States. With the addition of limited horticulture, populations began to increase, smaller territories evolved, and increased sedentism became apparent. New items such as soapstone vessels, grooved stone axes, ground stone tools and ornaments, and native copper ornaments are associated with this period. Late Archaic sites are known in the project region, and a Late Archaic projectile point was recorded within the immediate locale of the Olympic Venue.

The Woodland Period (800 B.C. - 900 A.D.) is characterized by the presence of pottery, a focus on horticulturalism, increased sedentism, and greater artifact variety. Horticultural development did not completely supplant hunting and gathering, which still contributed significantly to the subsistence economy. Increased social complexity is evident, as reflected by the development of burial mounds and permanent settlements. Use of the bow and arrow began during this period, and, subsequently, small triangular and corner-notched projectile points appeared. Woodland Period sites are recorded less frequently than Archaic sites, and none have been identified in the site area.

The Mississippian Period (A.D. 900 - A.D. 1540) represents the culmination of a long developmental process resulting from increased population growth and specialization, primarily due to investment in an agricultural economy. Large, permanent villages including public and defensive structures and ceremonial mounds, are found. No Mississippian sites are known in the project area.

The historic period (A.D. 1540 - 1838) Cherokee material culture resembles that of the early Mississippian Period early in the 1600s; however, trade with the newly arrived Europeans added many new items to the artifact inventory. By the 1790s, settlement patterns also underwent a shift from nucleated villages to scattered linear plans. As contact with Europeans increased, so did the Cherokees' dependence upon trade goods and the imposed economy, decreases in reliance on native technology. There was a considerable Cherokee occupation throughout the study area. All proto-historic and historic manifestations of Cherokee archaeological remains are referred to as Qualla Phase.

A.16.a.2. History

The Ocoee District was sparsely occupied by Euroamericans through the early 1800s, as it was still held by native Cherokees until their forced removal in 1838. The earliest survey of the area took place in 1837, with the first land purchases beginning in 1839. Most of the early settlers were small-scale farmers attracted to the area by the inexpensive land prices (a little as \$.01 per acre). The timber industry and milling were early historic activities in the region. It was not until the 1850s that significant deposits of copper ore were developed in the region. With construction of Old Copper Road in 1853, connecting Cleveland and Ducktown, a means was developed to bring ore out of the rugged country, and significant settlement began in the area. Old Copper Road was a direct stimulus to the copper industry in the region. From this point on, copper mining played a dominant role in the history of the Ocoee District (Barclay, 1946).

Copper mining near Ducktown reached a peak in the year immediately prior to the Civil War. Mining efforts were dominated by three firms, the Union Consolidated Mining Company, the Polk County Copper Company, and the Burra Burra Company. Federal troop occupation of Cleveland during the War brought an end to this economic boom.

Following the War, J. E. Raht took control of copper mining in the Ducktown region. Raht was responsible for widening the Old Copper Road at several points, and drill marks from dynamite blasts appear to date his improvements to the period from 1865 to 1878 (Barclay, 1946).

By the late 1870s, copper mining declined in profitability, as the mines became exhausted and as transportation costs made copper from the region unprofitable compared to other sources. By the late nineteenth century the region witnessed a mixed historic usage featuring timbering and small-scale subsistence farming. The Eastern Tennessee Power Company constructed two hydroelectric power dams, the Ocoee Dams No. 1 and No. 2, in 1910 and 1912, respectively. Power from these plants supplied eastern Tennessee.

Private development and timbering declined between 1920 and 1940, as much of the region's timber resources were depleted. This environmental degradation and the depressed economic conditions led to the acquisition of much of the region as the CNF by the Forest Service during the late 1930s. The Forest Service and TVA have since owned and managed much of the land within the region, allowing the natural forest vegetation to regenerate. Additional improvements to the region, in the form of recreation areas, dams, roads, and bridges, were completed by the Civilian Conservation Corps during the 1930s. The region remains today as mountainous forest, sparsely inhabited, and managed and maintained by the Forest Service as a public-use area.

A.16.b. Surveys of Cultural Resources

Cultural resources within, and adjacent to the project site were identified using surveys previously conducted by others, supplemented with an on-ground field survey undertaken in early 1993. The results of these surveys are discussed below.

A.16.b.1. Previously Recorded Cultural Resources

Two TDOT surveys (Slater, 1988; Kline, 1989), conducted near the proposed Olympic Venue recorded numerous archaeological sites, primarily nineteenth and twentieth-century historic dwelling sites. The only significant properties noted within the study area by these surveys are the three hydroelectric power plants on the river, Ocoee Powerhouse Nos. 1, 2, and 3. These structures and their associated compo-

nents (flumes, tunnels, dams, etc.) all are listed on the National Register of Historic Places.

Thieme and DuVall (1991) conducted a survey of the areas on the right bank to be affected by the Olympic Venue, but did not treat areas on the left bank of the Ocoee River which are currently included in design plans. They located and recorded two prehistoric sites (40PK374 and 40PK375) and portions of the Old Copper Road (40PK373-A&B). Site 40PK374 is a sparse scatter of quartz flakes and tools located on a ridge east of the Ocoee River. Site 40PK375 also is a sparse scatter of quartz flakes and tools located on a ridge west of the Ocoee River. Neither of these sites were considered significant. The Old Copper Road (40PK373-A&B) is considered eligible by the SHPO for listing in the National Register of Historic Places.

A.16.b.2. 1993 Cultural Resources Inventory

A cultural resources survey of previously unsurveyed areas was conducted as part of the baseline conditions inventory process. The survey was conducted in accordance with guidelines being developed between the Forest Service and the Tennessee State Historic Preservation Officer (SHPO) in a memorandum of agreement (MOA).

Historic use of the project region is demonstrated by the recording of two historic archaeological sites: 0320-1 (40PK175) and 0320-4 (40PK386), as well as by the presence of the Old Copper Road (40PK373) which was built to transport copper ore mined in the region. The two archaeological sites represent an apparent dwelling site (40PK175) and a blacksmith shop (40PK386). Both are likely to have been associated with the Old Copper Road, and are not within the immediate project area. Portions of the Old Copper Road are within the project area.

One archeological site (40PK387) was identified by the inventory as being outside the limits of the Olympic Venue effect zone. This site consists of an apparent prehistoric camp site. The site appears largely undisturbed, with no artifacts visible on the ground surface except where power line installation disturbed a 25 m² area. One hundred and fifty-four quartz and cryptocrystalline flakes were recovered from five shovel tests. Additionally, one Late Archaic Period projectile point was recovered. The average depth of the cultural deposit is 20 cm below ground surface. Two bifaces and a

uniface were noted on the ground surface in the disturbed area. This site represents a fairly unique resource, in that few Archaic Period ridge-top sites have survived in the region. Given that few undisturbed prehistoric sites have been recorded within the region, this site is considered eligible for inclusion in the National Register of Historic Places.

Pursuant to stipulations being formulated in an MOA between the Forest Service and the Tennessee SHPO, additional efforts were directed toward providing detailed documentation of Section A of Old Copper Road (40PK373-A), the north portion of which could be affected by proposed Olympic course construction. As noted earlier, this road has been determined eligible for listing in the National Register of Historic Places. Information was collected to aid in Register nomination preparation and to gauge the potential effects of the proposed project. To properly document the intact portions of the road, which extend from its northern terminus at the upper venue site south toward Ocoee Dam No. 3, the road was mapped with a tape and compass. The mapped portion encompasses 8,665 linear feet, at which point the road has been inundated by a beaver pond. South of this point, portions of the road could be identified only sporadically due to heavy undergrowth and erosional damage. *In situ* original road construction features such as boreholes, bridge abutments, and blast scars were noted and consecutively numbered. Additionally, sections of the road were described by construction techniques employed (e.g., cut, fill, and graded portions). Borrow pit locations were also noted on these field maps. Photographs were taken of representative road segments and cross-sections of cut-and-fill construction. Two previously discussed historic sites (0320-1 and 0320-4) were also recorded, due to their proximity to the road.

A.16.c. Identified Cultural Resources

One archeological site, the Old Copper Road, Section A (40PK373-A), was identified within the limits of the proposed Olympic Venue effect zone. As described above, the Old Copper Road consists of an historic road (used from circa 1849 through 1878) associated with copper mining activities in the region. This resource is considered significant as an integral element of this important historic activity, and as an important example of early transportation in the Southern Appalachians. The road is also significant for its engineering aspects.

CHAPTER IV

ENVIRONMENTAL CONSEQUENCES

IV. ENVIRONMENTAL CONSEQUENCES

A. INTRODUCTION

This chapter discusses the potential environmental consequences associated with each of the proposed alternatives. To provide the context in which potential environmental effects may occur, discussions of potential changes to both the built and natural environments are included in this EIS. Effects on each resource category are evaluated in light of the issues identified during the scoping process. These effects may occur as a direct result of development of the Olympic Venue, or as an indirect result caused by induced changes within the immediate region. Possible mitigation measures to minimize or eliminate the adverse environmental effects also are presented.

Cumulative effects result from "the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (CEQ, 1978). Cumulative effects are discussed by resource category in this chapter. The reasonable foreseeable development scenario evaluates potential uses of the site for the 10 year post-Olympic period.

Means of mitigating adverse environmental effects that may result from the potential implementation of each alternative are discussed as required by the NEPA. Mitigation measures are suggested for those components likely to experience substantial and adverse changes under any or all of these alternatives. Potential mitigation measures depend on the particular resource category affected. Mitigation measures are defined in CEQ regulations as actions that include:

- Avoiding the effect altogether by not taking a certain action or parts of an action.
- Minimizing effects by limiting the degree or magnitude of the action and its implementation.
- Rectifying the effect by repairing, rehabilitating, or restoring the affected environment.
- Reducing or eliminating the effect over time by preservation and maintenance operations during the life of the action.
- Compensating for the effect by replacing or providing substitute resources or environments.

A discussion of mitigation measures is included for those resource categories where it is applicable.

B. METHODOLOGY

The method selected to analyze the environmental consequences of the proposed alternatives utilizes a matrix evaluation technique that quantitatively and qualitatively correlates issues with environmental effects. Assumptions were made to reflect the conceptual nature of venue design at the time of EIS preparation, and to account for limitations of available data. It is noted that many features of the alternatives are similar, and therefore environmental effects in many instances would be common for each of the development scenarios. The following subsections provide more detailed discussion of the methodology used to conduct the assessment of environmental consequences.

B.1 Alternatives Analysis Process

The assessment of environmental consequences associated with implementation of Alternatives 1, 2, and 3 and the no-action alternative 4 involves measuring the quantitative or qualitative effect of each alternative on each resource category issue identified during the scoping process. Quantitative and qualitative aspects are summarized by resource-specific evaluation criteria. A resource assessment matrix (RAM) displays and summarizes the estimated quantifiable effects for each resource category. Evaluation criteria are arranged by alternative in matrix format. All alternatives are evaluated using the same set of evaluation criteria for each resource category. Where feasible, each alternative is quantitatively evaluated for anticipated extent of change from baseline conditions for each evaluation criterion.

B.2 Analytical Assumptions

The analysis of environmental consequences is based upon several assumptions, all of which affect assessment validity. The most critical assumptions used in developing the alternatives assessment are:

- Alternatives 1, 2, and 3 involving facilities development would not change significantly in concept or facilities from the conceptual scenarios presented in the Design Report (USDA, 1993).
- Data relating to the competitive channel as presented in the Design Report are technically correct, as are all site preparation, construction, and removal quantities, quantitative data relating to land acreage affected by each alternative, quantity pricing and cost estimates.
- Construction of the course and associated facilities would begin in 1994 and conclude with post-Olympic removal and rehabilitation.

Reconditioning of the site would take approximately 6 months.

- Construction materials, except for loose rock from the riverbed, would come from offsite areas.
- Loose rock used for construction materials would be mined by methods that will not expose acidic rock or soils.
- Recreational use data provided by TVA, TDEC, and the Forest Service are valid.
- A supplemental agreement would be made among the Forest Service and TDEC with TVA for reimbursement of costs associated with water diversion directly related to the Olympic events.
- Hydrologic data provided by TVA, including flow rates, sedimentation rates, cessation of sluicing operations, and electric generating capacity of Ocoee powerhouses, are correct.
- TVA-prepared topographic data for the Ocoee River channel are correct.
- Average daily traffic conversion factors provided by TDOT are valid.
- The traffic capacity of all two-lane sections of U.S. Highway 64 is similar.
- Vehicular traffic growth would continue to approximate 3 percent annually.
- Fifty percent of commercial trucks traveling on U.S. Highway 64 would be diverted to other routes during Olympic events.
- Three thousand VIPs, Olympic family, athletes and officials and 15,000 spectators per day would be shuttled from portals located in Cleveland and Ducktown. The VIPs and 6,000 spectators would come from the Cleveland portal.
- Adequate parking facilities would be located at the Cleveland portal.
- The total number of shuttle buses would be 350.
- Two, 3-hour shuttle periods per day would be used, one during the morning, and one during the evening.
- Shuttle buses would be parked in the eastbound lanes of the four-lane divided section of U.S. Highway 64.

B.3 Effects Common To Alternatives 1, 2, and 3

The three development alternatives under consideration all would be located proximate to the

same segment of the Ocoee River. Each alternative would contain all facilities specified in the ACOG program requirements, and with the exception of Alternative 1 which assumes removal of all facilities after the Olympic event, similar facilities would be retained after the 1996 Olympics. For this reason, many of the environmental consequences would be similar for each alternative evaluated. Therefore, as a means to facilitate comprehension, the effects common to all development alternatives are grouped, and are addressed first under each resource category.

C. ENVIRONMENTAL CONSEQUENCES

The environmental consequences of each of the alternatives, including the no-action alternative, are assessed in this section by resource category, reflecting issues raised during the scoping process.

C.1 Air Quality

Effects on air quality would occur during both construction and operations associated with development of the alternatives. Combustion emissions and intermittent fugitive dust (particulate matter) emissions could result from vehicles and construction needed for the event. Operational effects would occur from commercial transport vehicles and personal vehicles used for transportation to and from the proposed venue.

The evaluation of effects on air quality is based on identifying the sources of the effects, developing the quantitative measures for evaluating the extent of the effects, and applying formulas for computing and assessing those measures. The methods selected to analyze air quality effects depend upon the type of air emission source being examined. The primary emission sources associated with the alternatives are construction and vehicular traffic. Because construction-phase emissions are generally considered temporary, analysis is limited to estimating the amount of uncontrolled fugitive dust that may be emitted from disturbed areas, and the amounts of combusive emissions that may be emitted from construction equipment. Analysis for mobile source emissions (vehicle activity) consists of quantifying the emissions during the event and qualitatively evaluating how those emissions would affect maintenance of the national and state ambient air quality standards (AAQS).

To analyze effects from both construction and mobile sources, an emissions inventory was compiled. The emissions inventory is an estimate of total mass emissions of pollutants generated from a source or sources over a period of time, normally 1 year. These sources are identified, and effects are discussed in the sections that follow, and are sum-

marized in the air emissions assessment matrix (Table IV.C.1-1).

C.1.a Effects Common To Alternatives 1, 2, and 3

The majority of effects from construction and operation of the Olympic Venue would be similar for each of the alternatives.

C.1.a.1 Direct and Indirect Effects

Fugitive dust (particulate matter or TSP) and combustive emissions would be generated during construction activities associated with development of the temporary administrative and support facilities, the channel and parking areas. Fugitive dust is generated by pulverization and abrasion of surface materials through mechanical force such as land clearing, equipment traffic, excavation, and demolition/construction of facilities, and entrainment of dust particles by the action of the wind on exposed surfaces. These short-term emissions would be greatest during site clearing and grading activities, fill operations, and equipment operation. Emissions would vary significantly from day to day depending on the type of operation, level of activity, and the prevailing weather conditions, and would fall off rapidly with distance. A large amount of dust would be generated by equipment traveling over temporary haul roads.

Combustion emissions and intermittent fugitive dust (particulate matter) emissions could result from vehicles and construction needed for the event. Operational effects could occur from commercial transport vehicles and personal vehicles used for transportation to and from the venue. Total estimated emissions would represent an increase with regard to baseline conditions for Polk County. However, there are no state vehicle inspection and maintenance programs in place at this time to regulate and control emissions from mobile sources.

Vehicle engine combustion would cause increased concentrations of HC, CO, NO_x, and TSP. These emissions would be expected to fall off rapidly with distance, and not to result in significant long-term effects. The NO_x and HC could increase ozone concentration.

C.1.a.2 Cumulative Effects

Fugitive dust effects from construction activities are temporary and fall off rapidly with distance. With the application of Tennessee Air Pollution Control Regulation 1200-3-8, Fugitive Dust, and proper mitigation measures, no cumulative air quality effects from fugitive dust are anticipated. High concentrations of ozone affect vegetation resulting in leaf damage and/or reductions in crop yield. Ozone also degrades synthetic rubbers, textiles, and

paint colors; and may be a major cause of fading in fabrics (Hillsborough County, 1988, Environmental Protection Commission, 1988 Air Quality Report).

C.1.a.3 Mitigation Measures

Mitigation for potential air quality effects would be directed at reducing overall emissions and the resulting pollutant concentrations. Abatement strategies to mitigate air pollutant effects can be implemented during both the construction and event operation phases of the development alternatives. Abatement strategies implemented during the construction phase are straight-forward and a matter of regulatory enforcement. It should be noted that abatement actions are not mandatory as long as air quality rules and regulations are being met. Numerous methods are available to mitigate fugitive dust emissions during construction activities. These methods include:

- Complying with FSEM-7200-100R, Forest Service Specifications for Construction of Roads and Minor Drainage.
- Implementing a watering program during (limited for Alternative 1) fill operations and excavation. This is the most common dust abatement method, and twice-a-day water application can reduce emissions by at least 50 percent (EPA, 1985). Watering for dust control should only be done as conditions dictate, such as when a nuisance is being created off-site. Other methods of dust suppression that could be employed to limit the use of water, such as chemical stabilization, soil binders, or compaction of fill material could be used.
- Applying water or chemical stabilization to dirt roads and heavily traveled primary haul route sections as necessary.
- Clearing areas on a selective basis to reduce exposed soil to windy conditions.
- Treating disturbed areas after clearing, grading, earth moving, or excavation is completed through watering, revegetation, spreading soil binders, or compacting fill material until areas are paved or developed.
- Specifying the time period during which newly graded sites are exposed to the elements. This further mitigates fugitive dust emissions by some factor directly related to the reduction in exposure time.
- Sodding, seeding, mulching, or landscaping areas as soon as possible after clearing or grading, per Forest Service specifications.
- Reducing vehicle/equipment traffic and speed on temporary roads.

TABLE IV.C.1-1
Air Quality Assessment Matrix

Alternative	Source	Total	Emissions, ton/working day			
		Vehicles	HC	CO	NO _x	TSP
Alternative 1	Vehicles					
	Olympic event	658	0.11	1.74	0.85	0.18
	Construction		0	0	0	0.01
Alternative 2	Vehicles					
	Olympic event	708	0.11	1.74	0.83	0.17
	Construction		0	0	0	0.01
Alternative 3	Vehicles					
	Olympic event	708	0.11	1.74	0.83	0.17
	Construction		0	0	0	0.01
Alternative 4	Vehicles					
	Background	5140	0.27	3.35	0.56	0.03

Notes: Conversion from grams/hour to tons/day as follows: (vehicle emissions, gram/hour)(1 lb/453.6 gram)(1 ton/2000 lb)(8 hour/working day) = vehicle emissions, ton/working day.

Construction emissions reflect uncontrolled fugitive dust emissions from ground disturbing activities (land clearing and grading) for the construction of temporary and/or permanent facilities. Emissions are calculated using EPA (1985) emission factors (see text).

Fugitive dust emissions from demolition of the temporary structures are not quantified because the original design specifications make it difficult to quantify the amount of land that would be disturbed in these activities. It is, however, expected that demolition of the temporary structures would involve minimal ground disturbance (no land clearing or grading) and, therefore, would generate an insignificant amount of fugitive dust emissions.

Temporary facilities would include fabric or tent-like shelters, trailers, platforms, and/or a series of temporary bleachers fabricated onsite using steel angle components on temporary concrete foundations.

Fugitive emissions would be generated by trucks (dust plumes trailing behind vehicles traveling on unpaved roads) removing fill from the river to restore it to its natural condition under Alternative 1. There should be no fugitive emissions from the load - it is assumed the fill would be wet and covered.

Total fugitive emissions that would be generated by trucks traveling on unpaved roads during removal of fill from the river (to restore it to its natural condition) under Alternative 1 are: 11.06 tons. This quantity of fugitive dust is temporary and is expected to be much less than the annual amounts generated by large industries, such as steel and phosphate plants. In addition, the dust would be localized and fall off rapidly with distance and time (i.e., settling). With the application of water and other dust-suppression methods (Tennessee Air Pollution Control Regulation 1200-3-8 Fugitive Dust), no cumulative effects from fugitive dust generated during demolition (removal of the river fill) would be anticipated.

Sources: Vehicle emission factors calculated based on EPA, AP-42, Compilation of Air Pollutant Emission Factors, Volume 2: Mobile Sources, 4th edition, September, 1985.
EPA, 1985.

- Developing asphalt roads as soon as possible.
- Cleaning (sweeping) paved roads adjacent to sites as necessary.
- Terminating activities during high wind conditions.
- Removing dust-producing materials as soon as possible.

Combustive emissions from construction vehicles/equipment can be mitigated by efficient scheduling of equipment use, implementing a phased construction schedule to reduce the number of units operating simultaneously, and performing regular vehicle engine maintenance. It is estimated that implementation of these scheduling and maintenance measures would reduce combustive emissions and air quality effects from construction activities associated with the alternatives by 10 to 25 percent.

Operational mitigation measures should focus on transportation planning and management measures to reduce motor vehicle pollution. The purpose of these measures would be to reduce vehicle miles traveled, vehicle trips, peak hour travel, movement at a low rate of speed, and excessive idle time. These reductions would, if implemented, reduce both regional and localized vehicle-related emissions of CO, NO_x, VOCs, and PM-10.

The types of operational mitigation measures that could be implemented include: (1) development of the bus shuttle system to serve the venue in order to reduce personal vehicle use, (2) use of offsite parking and parking lot shuttles, and (3) parking lots located and designed to reduce congestion and waiting times.

C.1.b Alternative 1

Alternative 1 is based on the assumption that after the Olympic events the site would be returned to near-baseline condition. All facilities would be temporary, functioning only for Olympic use and based on program requirements set forth by ACOG.

C.1.b.1 Direct and Indirect Effects

Total estimated daily emissions from Alternative 1 for the year 1996 are presented in Table IV.C.1-1. These emissions would represent an increase compared to baseline conditions for Polk County. Table IV.C.1-1 also provides projected particulate emissions in terms of TSP. The monitoring data, emission inventories, and calculations for the alternatives are based on TSP emission factors.

The quantity of fugitive dust emissions from a construction site is proportional to the land being disturbed and the level of construction activity. EPA (1985) has estimated that uncontrolled fugitive

dust emissions from ground-disturbing activities would be emitted at a rate of 110 pounds per acre per working day, or 1.2 tons per acre of construction per month of activity. A more recent EPA (1988) report allows calculations of PM-10 emissions from some open dust sources based on the PM-10/TSP emission factor ratio. The PM-10/TSP ratios range from 0.22 to 0.50. For this analysis, it is assumed that the PM-10 fraction of the fugitive dust emissions from construction activities would be 0.50 (50 percent) or 0.6 ton per acre per month (55 pounds per acre per working day). There is minimal grading (excavation) proposed within this alternative. To minimize construction effects, all facilities would be located on scaffolding or on existing grade (USDA, 1993).

It is estimated that land disturbing activities related to construction and breakdown (post-Olympic removal) of temporary facilities would disturb a total of approximately 24.90 acres (USDA, 1993) over the period of development and breakdown. Assuming that the disturbance is spread evenly throughout this period, the maximum area of disturbance on any one working day is estimated to be approximately 0.14 acres, assuming 20 working days per month. The average unmitigated or uncontrolled amount of particulate emissions would therefore be 0.008 ton per working day or 0.004 ton per working day of PM-10. These emissions would cause exposures to elevate short-term concentrations of particulates for receptors close to the construction areas. However, the elevated concentrations would be a temporary effect that would fall off rapidly with distance.

Vehicle engine combustion from Alternative 1 would cause, roughly, a 41 percent increase in HC, a 52 percent increase in CO, a 152 percent increase in NO_x, and a 600 percent increase in TSP emissions over background emissions. These emissions are lower than background emissions: 0.11 HC, 1.74 CO, 0.85 NO_x, and 0.18 TSP, and would be expected to fall off rapidly with distance. The emissions are not expected to result in significant long-term effects. Combustion engine exhausts would be temporary and, like the fugitive dust emissions, would not be expected to result in significant long-term effects.

C.1.b.2 Cumulative Effects

Cumulative effects would be the same as those common to Alternatives 1, 2, and 3 (see Section C.1.a.2.). It should be noted, however, that additional fugitive dust would be generated by trucks traveling over temporary haul roads during removal of the river fill (part of the demolition required under this alternative). The additional dust would be localized and temporary. It would be expected to

fall off rapidly with distance and time; therefore, no cumulative impact would be expected.

C.1.b.3 Mitigation Measures

Mitigation measures would be the same as those common to Alternatives 1, 2, and 3 (see Section C.1.a.3.).

C.1.c Alternative 2

Alternative 2 allows for selected facilities to have continued post-Olympic use. Some of the on-site facilities would be utilized by the Forest Service after the Olympic events.

C.1.c.1 Direct and Indirect Effects

The projected vehicle trips per day associated with this alternative are greater than those estimated for Alternative 1 (See Table IV.C.1-1). Total estimated daily emissions for this alternative are presented in Table IV.C.1-1 for 1996. These emissions would be less than background emissions.

The description and effects of construction related activities would be similar to Alternative 1 with the following exceptions. Construction effects from this alternative would be less than Alternative 1 because of the decreased amount of land disturbance associated with post-Olympic removal or demolition. Grading is limited to the athletes' day use area and the broadcast compound. All other areas would be constructed on river fill or built on existing grade (USDA, 1993). It is estimated that land clearing and grading for construction of temporary and permanent structures would disturb a total of approximately 17.85 acres (USDA, 1993) over the 1994 to 1996 period of development and breakdown. Of this total, a maximum of 10.2 acres would be graded. The average amount of land that would be disturbed on any one working day during land clearing and grading is 0.10 acre/working day. The average unmitigated amount of particulate matter emissions would therefore be 0.006 ton per working day, or 0.003 ton per day of PM-10. The effect of these emissions would cause elevated short-term concentrations of particulates at receptors close to the construction areas. However, the elevated concentrations would be a temporary effect that would fall off rapidly with distance.

Total estimated emissions associated with operations under Alternative 2 are the same as for Alternative 1.

The projected automobile and recreational vehicle trips per day associated with this alternative are greater than those estimated for Alternative 1; the projected truck and bus trips per day associated with this alternative are less than those estimated for Alternative 1. HC and CO emissions from this al-

ternative would be the same as for Alternative 1; NO_x and TSP emissions would be slightly less than those for Alternative 1.

C.1.c.2 Cumulative Effects

Cumulative effects would be the same as those common to Alternatives 1, 2, and 3 (see Section C.1.a.2.).

C.1.c.3 Mitigation Measures

Mitigation measures would be the same as those common to Alternatives 1, 2, and 3 (see Section C.1.a.3.).

C.1.d Alternative 3 - Proposed Action

Alternative 3 provides facilities for recreation and whitewater training and competition after the 1996 Olympics. Within the scope of this alternative, several ACOG programmed facilities would be retained for future National Forest uses.

C.1.d.1 Direct and Indirect Effects

The projected vehicle trips per day associated with this alternative are equal to those estimated for Alternative 2. Total estimated daily emissions for this alternative are presented in Table IV.C.1-1 for 1996. These emissions would represent an increase compared to baseline conditions for Polk County.

Construction effects from this alternative would be less than for Alternative 1 because of the decreased amount of land-disturbing activities required. Grading is limited to the athletes' day use area and the broadcast compound. All other areas would be constructed on river fill or built on existing grade (USDA, 1993). It is estimated that land clearing and grading for construction of temporary and permanent structures would disturb a total of approximately 19.77 acres (USDA, 1993) over the 9 month period of development and breakdown. The average amount of land that would be disturbed on any one working day during land clearing and grading is 0.110 acre/working day. The average unmitigated amount of particulate matter emissions would therefore be 0.006 ton per working day, or 0.003 ton per working day of PM-10. The effect of these emissions would cause exposures to elevated short-term concentrations of particulates for receptors close to the construction areas. However, the elevated concentrations would be a temporary effect that would fall off rapidly with distance.

The projected vehicle trips per day for all classes of vehicles (automobiles, trucks, buses and recreational vehicles) associated with this alternative are equal to those estimated for Alternative 2. HC and CO emissions from this alternative would be the same as for Alternatives 1 and 2; NO_x and TSP

emissions would be the same as those for Alternative 2 and less than those for Alternative 1.

C.1.d.2 Cumulative Effects

Cumulative effects would be the same as those common to Alternatives 1, 2, and 3 (see Section C.1.a.2.).

C.1.d.3 Mitigation Measures

Mitigation measures would be the same as those common to Alternatives 1, 2, and 3 (see Section C.1.a.3.).

C.1.e Alternative 4 - No Action

No construction would be required under the No Action Alternative, and no vehicles in addition to existing traffic would be predicted. Emissions would be the same as baseline conditions. There would be no effect on air quality from this alternative.

Direct and indirect effects would mirror baseline conditions. Cumulative effects associated with the no-action alternative would not be expected, and mitigation measures would therefore not be required.

C.2 Traffic and Transportation

As stated in Chapter III, the only highway access to the proposed Olympic Venue is via U.S. Highway 64. This section will analyze the effects of the proposed alternative actions on Highway 64 between Ducktown and Cleveland, Tennessee. The analysis will consist of establishing background (not related to the event) traffic and forecasting event-related traffic and estimating the traffic effects on U.S. Highway 64.

The Whitewater Slalom Event of the 1996 Olympic Games will be held on Friday, Saturday, and Sunday, July 27, 28, and 29, 1996. The traffic effects described in this section are anticipated to occur only on those dates. However, there will be a lingering effect of the Olympic games on area traffic as the increased awareness of the Ocoee River attracts tourists in the future, and potential additional competitive events are held. These projected effects will be described in this section. The traffic effect of constructing the venue is also discussed.

The traffic counts presented in Chapter III were adjusted to reflect a weekend in July 1993. These traffic estimates will serve as the baseline for forecasting future background traffic volumes. Traffic on U.S. Highway 64 has been growing at the rate of approximately 3 percent per year. This analysis assumes that this rate of growth will continue. Based upon these assumptions, the background traffic on U.S. Highway 64 in 1996 would range from 443

vehicles per hour in the Ocoee Gorge to 1,401 vehicles per hour west of U.S. 411. Figure IV.C.2-1 depicts the projected background traffic conditions in the study area in 1996. The LOS is expected to decrease to E between S.R. 314 and S.R. 30.

Other factors may cause this traffic volume to change during the July 27 to 29 period if the event is held. It is assumed that TDOT or ACOG would post signs on U.S. Highway 64 in the months preceding the event warning of congested conditions during the Olympic event. It is assumed that these signs would reduce the number of commercial trucks on U.S. Highway 64 by 50 percent during this period, as trucks would shift schedules and routes to avoid potential delays in the area. This shift in commercial traffic to other truck routes could cause increased congestion and air and noise pollution along these temporary routes. This reduction in truck traffic would have the effect of increasing the available capacity of U.S. Highway 64. However, the prestige of the Olympic games is certain to attract a number of curious onlookers without tickets who will attempt to drive by the venue. It is assumed that non-truck traffic in the vicinity of the venue would increase by 25 percent due to these onlookers.

The adjusted traffic conditions for July 1996, assuming reduced trucks and increased onlookers, are shown in Figure IV.C.2-2. LOS in the gorge and the roadway west of the gorge would increase, as the benefit of the reduction in trucks would be greatest in this area.

Traffic and transportation-related effects are discussed in the sections that follow and are summarized in the assessment matrix, Table IV.C.2-1 for each of the alternatives proposed.

C.2.a Effects Common To Alternatives 1, 2, and 3

The transportation-effect analysis is similar for each of the development alternatives considered. The permanency of the site and the facilities at the site will make little difference in the transportation effects created by the act of transporting spectators and others to and from the venue. The alternatives differ in the number of parking spaces provided. Alternative 1 would provide 41 automobile parking spaces at the site, and Alternatives 2 and 3 each would provide 66 spaces. This difference would result in a small change in the mix of autos and buses traveling to the event to accommodate the estimated 3,000 VIPs. All alternatives would use the same number of buses to transport spectators.

C.2.a.1 Direct and Indirect Effects

Transportation to and from the Olympic Venue, traffic safety, and venue parking will gener

Figure IV. C. 2-1



Figure IV. C. 2-2



TABLE IV.C.2-1
Traffic and Transportation Assessment Matrix

Measure	Alternative			
	1	2	3	4
Bus trips in peak hour ^(a)	157	155	155	0
Minimum LOS on U.S. 64	F	F	F	F
Adequate turning radius for buses ^(b)	Yes	Yes	Yes	NA ^(c)
Parking spaces within walking distance	41	66	66	0
Pedestrian safety provisions	Yes	Yes	Yes	NA
Bicyclist safety provisions	No	No	No	No

- a Reflects bus trips in both the peak direction (toward Cleveland), and the non-peak direction (toward Ducktown).
- b Adequate room for bus turning would be available at the site in Alternatives 1, 2, and 3. However, U.S. 64 is deficient in Ocoee Gorge with regard to safe turning radius on several curves, (Tennessee Department of Transportation, 1990).
- c NA - Not Applicable

ate effects in the ROI of the proposed venue. Commercial rafting outfitters would be affected by the increased traffic on U.S. Highway 64 due to the event and would affect the event traffic by driving on U.S. Highway 64 with their shuttle buses.

As available parking for autos in the vicinity of the site is limited, ACOG plans to utilize a bus shuttle system to transport spectators, officials, vendors, and athletes to the venue from portals located in the vicinity of Cleveland and Ducktown. ACOG expects 15,000 spectators and 3,000 VIPs (including dignitaries, Olympic families, athletes, vendors, and officials) to attend the event each day during the July 27-29 event period.

As bus transportation is being proposed to carry passengers to and from the venue, no other form of alternative transportation would be feasible. Although freight railroad service is available in the area, passenger service is not. Also, rail does not directly serve the proposed venue location.

A formal shuttle plan has not been developed at this time. The assumptions regarding the shuttle plan used for this analysis are as follow. One-half of the 15,000 spectators would be shuttled to the venue from the Cleveland area, and one-half would be shuttled from the vicinity of Ducktown. There will be approximately 350 buses used to shuttle the spectators. Each bus would accommodate approximately 43 passengers and would be approximately 40 feet in length. At the venue, the 15,000 spectators would depart the buses in the existing eastbound lanes of U.S. Highway 64 (to be closed during the event days) at a point just west of the venue. Each empty bus would turn westbound into the through traffic lanes of U.S. Highway 64 and drive to the western terminus of the four-lane section. The buses would U-turn and park bumper-to-bumper on the shoulder and the outside driving lane of the closed eastbound lanes.

VIPs would be shuttled by two types of buses. For Alternative 1, it is assumed 23 buses, each 28 feet long, would be used, along with approximately 55 buses that are 40 feet long. Alternatives 2 and 3 are assumed to use 54 40-foot buses and 22 28-foot buses. Each 28-foot bus would carry approximately 23 passengers, and the 40-foot buses would be similar to those to be used to carry the spectators. All of the VIPs would be shuttled from the Cleveland area. Spectators would be transported to and from the portals for a 3-hour period in the morning before the event and a 3-hour period in the afternoon after the event. The shuttle period for VIPs would be 2 hours. The bus traffic would be distributed evenly over the 2- and 3-hour periods.

The buses used to transport the VIPs would be parked in several lots located along U.S. Highway 64 in the Boyd's Gap area between the venue and Ducktown. There would also be several tractor-trailers parked in lots along this section of U.S. Highway 64.

Spectators would disembark from the shuttle buses at the drop-off point at the west end of the venue. Spectators would walk approximately a 0.25 to 0.50 mile to the bleachers, depending upon seating location. A large share of the pedestrian path would be located in the eastbound lanes of U.S. Highway 64, which would be closed to all vehicular traffic east of the drop-off point. The VIP drop-off point will be at the east end of the venue. Bicycle facilities will not be provided at the proposed Olympic Venue. Hazardous conditions along U.S. Highway 64 preclude safe cycling.

Traffic control could be provided by the Tennessee Highway Patrol and/or other agencies, such as the local Sheriff's Department or the Tennessee National Guard Military Police.

A serious traffic safety condition exists in the Ocoee Gorge area. As stated in Chapter III, TDOT (1990) indicated there is one curve in the gorge that a tractor-trailer cannot negotiate without crossing the center line. A geometric analysis indicates a large, 40-foot bus would be able to stay in its lane only if the driver negotiates the curve perfectly, and uses the entire lane in the process. Based on highway geometrics, there is a good chance that some of the buses may cross the center line. There would be 86 or more large buses traveling westbound during each hour of the 3-hour afternoon shuttling period. Based on the assumption that 50 percent of the tractor-trailers that normally use U.S. Highway 64 would choose to divert, approximately 12 tractor-trailers are projected to be traveling eastbound through the gorge each hour. Therefore, somewhere along U.S. Highway 64, a bus would meet a tractor-trailer every 4 seconds. This would be occurring for approximately 6 hours each day (reverse direction in the morning), for the 3-day period during the event. As a result, there is a potential for increased accidents on the tight corners in the gorge.

There would be limited parking spaces in the vicinity of the venue. Alternative 1 would provide 41 spaces, and Alternatives 2 and 3 would provide 66 spaces. It is assumed that the on-site spaces would be used by service and technical support staff. Most of the available parking in the area has been designated by ACOG for use by event VIPs, including media and service trucks. Potential parking areas that have been identified include:

- The eastbound lanes of U.S. Highway 64 west of the proposed venue location would be used to park the 350 buses used to shuttle spectators (a specific parking location has not been identified for the 38 to 40 buses used to shuttle the VIPs, but it is assumed that they would park in the Boyd's Gap area);
- A small pulloff area at the proposed venue location currently can accommodate approximately 25 cars for service staff and technical support (this would be expanded to provide 41 spaces in Alternative 1 and 66 spaces in Alternatives 2 and 3); and
- A paved area to the east of Boyd's Gap for large, support tractor-trailer parking.

Preliminary shuttle bus assumptions call for one-half of the 15,000 spectators to be shuttled from Ducktown and one-half from Cleveland. Assuming each car would carry 3 people, then parking for 2,500 vehicles would be required at each shuttle pick-up location. Since Cleveland has a college, shopping centers, and other large parking facilities, it is assumed that adequate parking could be contracted to allow the shuttle system to operate efficiently from Cleveland. The Copper Basin area has very limited improved parking availability for this large number of vehicles.

During construction, the addition of construction vehicles to existing U.S. Highway 64 traffic will lower the LOS between S.R. 314 and S.R. 30.

C.2.a.2 Cumulative Effects

Cumulative effects include combined effects of other actions on the area. There are no other known actions pending and therefore no cumulative effects are anticipated.

C.2.a.3 Mitigation Measures

A transportation plan will be developed by the state. This plan will be completed in 1995. For purposes of this analysis, it is assumed that there will be an equal split of spectators entering the event site from the east and west portals.

LOS reduction and accident potential are the highest on the two-lane portion of U.S. Highway 64 west of the proposed venue. A potential mitigation measure would be to increase the radius of the tight turns in the Ocoee Gorge. This would allow heavy vehicles, such as trucks and buses, to pass one another and remain in their respective lanes.

If it is not feasible to advance this improvement for construction prior to the event, measures should be taken to reduce the congestion and accident potential on the proposed venue to Cleveland shuttle route. Ideally, the road should be closed to

non-event traffic to allow the buses 24 feet to safely negotiate the curves in the gorge and provide adequate LOS throughout the remainder of the 2-lane section. At a minimum, the dangerous curves should be corrected to allow all vehicles using the road to remain safely in their travel lane. Increasing the number of buses accessing the venue from the Ducktown area is a potential mitigation measure, but there are insufficient hotel/motel units in the vicinity. Most out-of-town spectators using the Ducktown shuttle would be forced to drive nearly 2 hours each way to Ducktown.

Because toxic materials are transported on U.S. Highway 64, it may be prudent to close U.S. Highway 64 to commercial trucks carrying toxic materials during the Olympic events. If any agency, such as TVA, the Forest Service, Tennessee Emergency Management, the Highway Patrol, or the local Sheriff's Office makes a recommendation to close U.S. Highway 64 to trucks carrying toxic materials during the event, a request will be made to TDOT and the Federal Highway Administration to do so.

Potential mitigation measures might include finding a source of construction materials east of the proposed venue, and possibly night-time construction when background traffic on U.S. Highway 64 is reduced. Night construction needs additional investigation as background truck traffic may increase at nights, thereby increasing the possibility of an accident at one of the tight curves.

With regard to parking, a field investigation provided the following potential additional parking locations:

- Boyd's Gap Overlook could accommodate about 100 cars if both the paved and unpaved areas were used.
- The Copper Basin High School, just south of U.S. Highway 64 on S.R. 68, could accommodate several hundred cars.
- An existing industrial park west of Ducktown could accept approximately 100 cars.
- The currently vacant site of the proposed Basin Shopping Center at the southwest corner of U.S. Highway 64 and S.R. 68 could accommodate 3,000 or more cars, if available.
- Road rights-of-way could potentially be used for temporary parking, including:
 - Those in a residential area south of U.S. Highway 64 near Ducktown;
 - A portion of the three-lane section east of the proposed venue; and

- The median of U.S. Highway 64 east of Ducktown (some grading and traffic controls possibly required).

C.2.b Alternative 1

Alternative 1 would result in implementation of a shuttle system to transport spectators and event-related traffic. The shuttle plan described previously in this section would be assumed for Alternative 1.

C.2.b.1 Direct and Indirect Effects

In order to assess transportation impacts, this transportation analysis will analyze the travel conditions during the peak travel period of the day. The alternative would result in approximately 99 buses and 21 cars traveling westbound on U.S. Highway 64 between the venue and Cleveland during the afternoon peak hour. Eighty-seven of the buses would be large, 40-foot buses. Approximately 58 buses would travel between the proposed venue and Ducktown during the same period. Figure IV.C.2-3 shows the projected traffic volumes in the ROI, including background traffic adjusted for diverted trucks and increased on-lookers.

The large increase in buses would have the effect of lowering the capacity on U.S. Highway 64, particularly to the west of the proposed venue in the westbound direction (see Appendix G-3).

The LOS on the two-lane portion of U.S. Highway 64 to the west of the proposed venue deteriorates to LOS F during the event. However, U.S. Highway 64 was projected to operate at LOS F in 1996 due to background traffic growth alone. The assumption of reduced truck traffic on U.S. Highway 64 in anticipation of the Olympic event allows the LOS to increase to D during the event. On the remaining sections of U.S. Highway 64, LOS would remain the same as the LOS with background traffic only.

The proposed Olympic Venue is projected to be constructed between May 1994 and May 1995. Construction would not take place during the winter months (December 15 through March 15) (Betts Engineering Associates, 1993). Construction is assumed to occur 6 days per week for that period, and would consist of trucks bringing in equipment and materials and passenger vehicles used by the construction employees. It is anticipated that the two eastbound lanes of U.S. Highway 64 to the west of the venue will be closed (similar to the closure during the event) to provide parking for the construction vehicles.

The afternoon peak hour background traffic projected for a weekend in July 1994 is shown on Figure IV.C.2-4. As stated previously, background traffic is expected to increase at the rate of 3 percent

per year. The LOS would be similar to the existing 1993 conditions.

Figure IV.C.2-5 depicts the construction effects of Alternative 1. This alternative would add 43 autos and 6 heavy trucks to U.S. Highway 64 west of the venue during the afternoon peak hour. This is less than half of the trucks added by the Alternatives 2 and 3. However, as this alternative is temporary, the site must be torn down and hauled away after the event. Removal of the construction materials will require more than 4,800 truckloads of material be excavated from the site and hauled away. This will occur in 1996 after the event.

C.2.b.2 Cumulative Effects

Cumulative effects would be the same as those common to Alternatives 1, 2, and 3 (see Section C.2.a.2.).

C.2.b.3 Mitigation Measures

Mitigation measures would be the same as those common to Alternatives 1, 2, and 3 (see Section C.2.a.3.).

C.2.c Alternative 2

Alternative 2 would include implementation of a shuttle system to transport spectators and event-related traffic. The shuttle plan previously described was assumed in evaluating this alternative.

C.2.c.1 Direct and Indirect Effects

This alternative would result in approximately 97 buses and 33 cars traveling westbound on U.S. Highway 64 between the venue and Cleveland during the afternoon peak hour. Eighty-six of the buses would be large, 40-foot buses. Approximately 58 buses would travel between the proposed venue and Ducktown during the same period. Figure IV.C.2-6 shows the projected traffic conditions within the study area for Alternatives 2 and 3, which are the same for both. The LOS on all sections of U.S. Highway 64 would be the same as the LOS under the Alternative 1 scenario.

Figure IV.C.2-7 depicts the effects of construction traffic associated with Alternative 2. This alternative will add 57 autos and 12 heavy trucks to U.S. Highway 64 west of the venue during the afternoon peak hour. However, since this alternative is temporary in part, a portion of the site must be torn down and hauled away. Removal of the construction materials will require nearly 650 truckloads of material be removed from the site and hauled away. This will occur in 1996 after the event.

Figure IV. C. 2-3

1996 TOTAL TRAFFIC
ALTERNATIVE 1

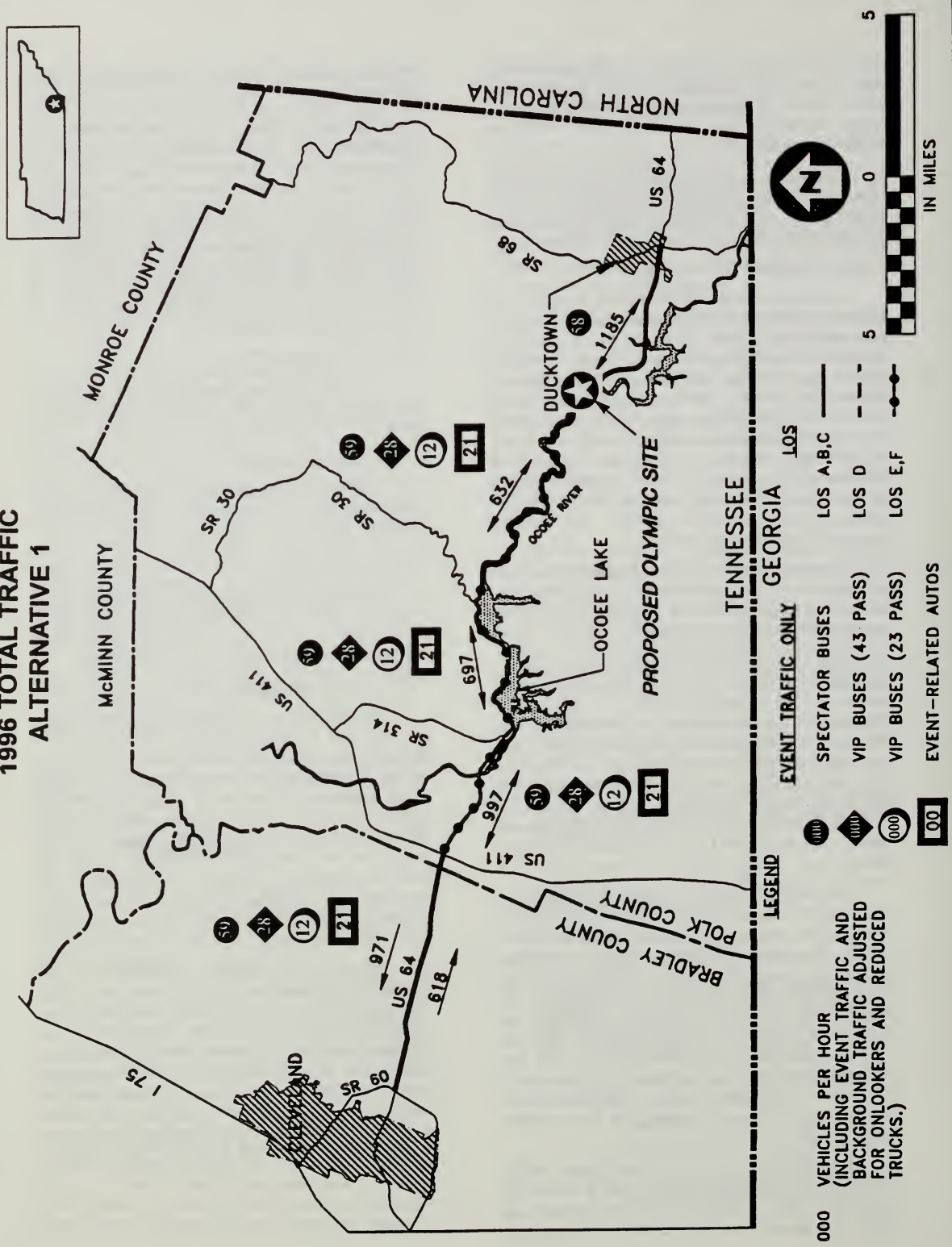
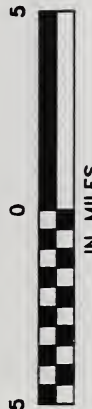
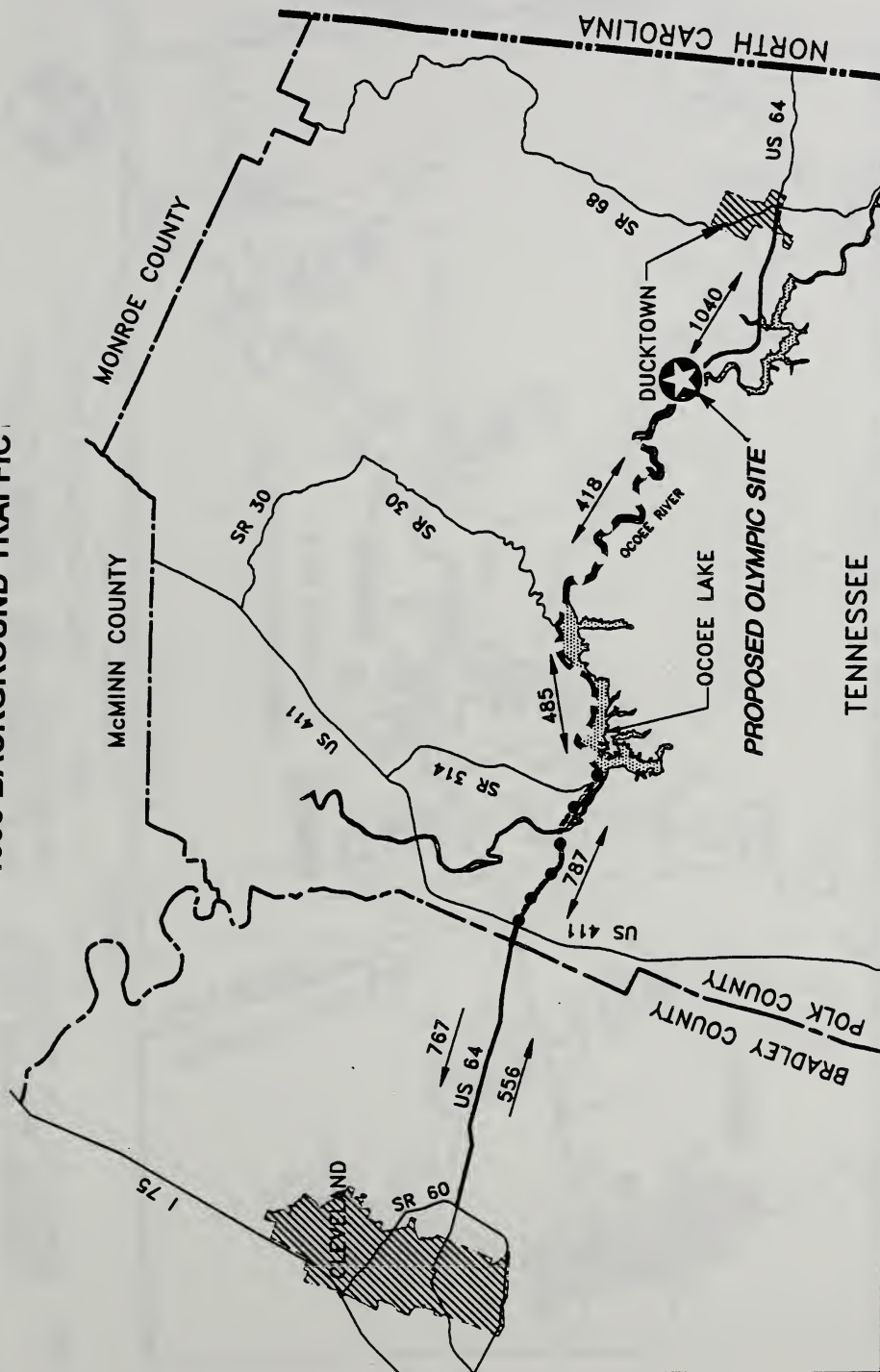


Figure IV. C. 2-4
1996 BACKGROUND TRAFFIC



GEORGIA

LEGEND

LOS A,B,C

VEHICLES PER HOUR
(est. JULY 1994 WEEKEND)

000

LOS D

EACH DIRECTION



LOS E,F

BOTH DIRECTIONS



Figure IV. C. 2-5
 1994 TOTAL TRAFFIC
 VENUE CONSTRUCTION
 ALTERNATIVE 1

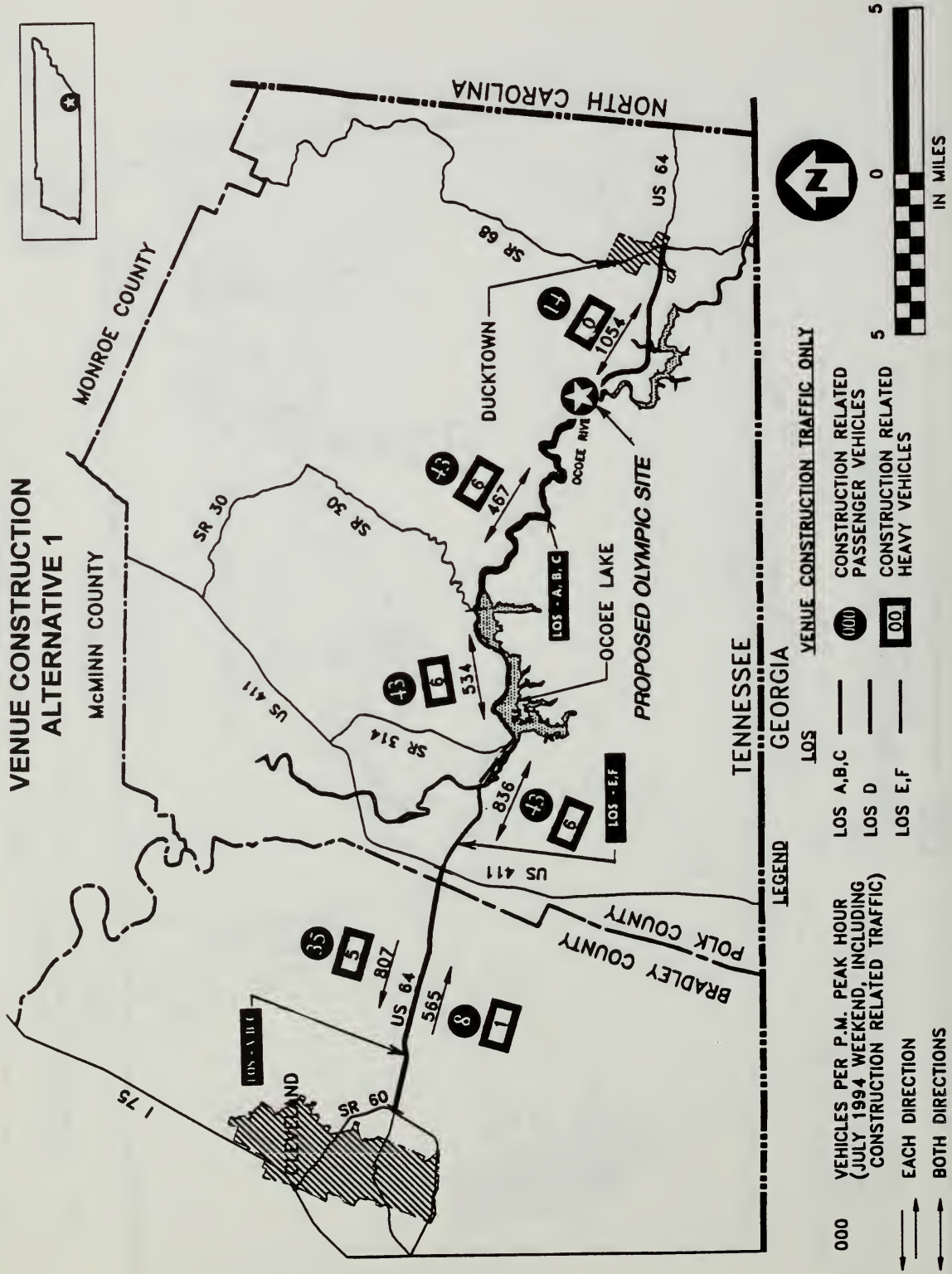


Figure IV. C. 2-6
1996 TOTAL TRAFFIC
ALTERNATIVE 2 AND 3

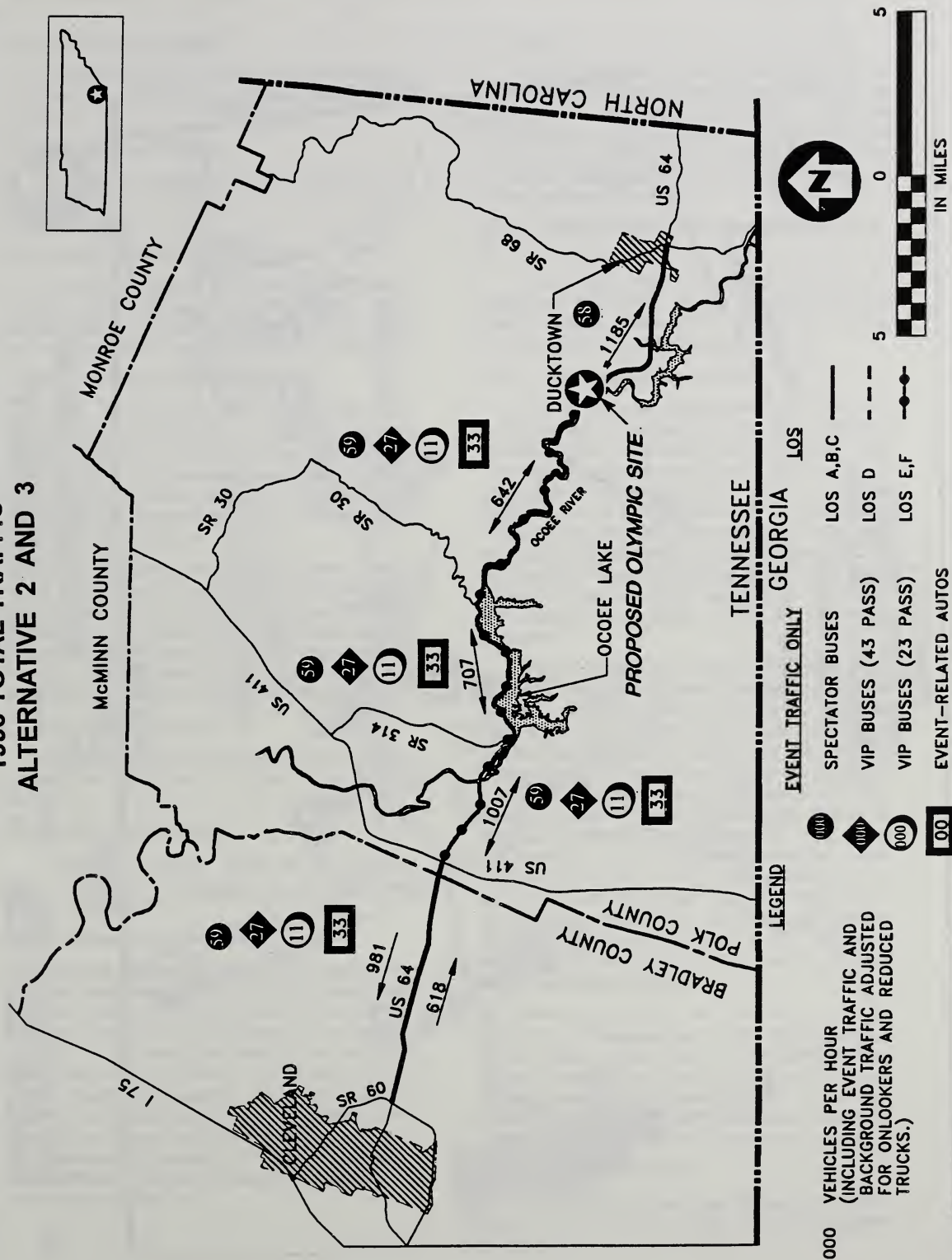
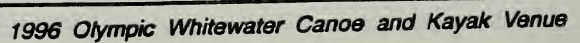


Figure IV. C. 2-7



C.2.c.2 Cumulative Effects

Cumulative effects would be the same as those common to Alternatives 1, 2, and 3 (see Section C.2.a.2.).

C.2.c.3 Mitigation Measures

Mitigation measures would be the same as those common to Alternatives 1, 2, and 3 (see Section C.2.a.3.).

C.2.d Alternative 3 - Proposed Action

Alternative 3 would include implementation of a shuttle system to transport spectators and event-related traffic. The shuttle plan described previously in this section will be assumed for these alternatives.

C.2.d.1 Direct and Indirect Effects

With the exception of construction-related traffic, the effects of Alternative 3 would be very similar to those of Alternative 2. Alternative 3 would result in the greatest number of trucks and employees required for construction. Figure IV.C.2-8 describes the construction-related traffic and total traffic for this alternative.

This alternative would add 61 autos and 15 heavy trucks during construction to U.S. Highway 64 west of the venue during the afternoon peak hour. While much of the construction for this alternative is permanent, there would be some temporary construction. Trucks would be required to haul away the temporary structures after the event.

C.2.d.2 Cumulative Effects

Cumulative effects would be the same as those common to Alternatives 1, 2, and 3 (see Section C.2.a.2.).

C.2.d.3 Mitigation Measures

Mitigation measures would be the same as those common to Alternatives 1, 2, and 3 (see Section C.2.a.3.).

C.2.e Alternative 4 - No Action

Baseline traffic conditions would continue under the no-action alternative. Traffic volumes would continue to increase at approximately 3 percent per year, and sections of U.S. Highway 64 would remain at LOS F. The dangerous condition of an event shuttle bus meeting a heavy truck on the deficient curves would be eliminated. Increased traffic is likely over the long term given the popularity of the Ocoee River among whitewater enthusiasts. Direct and indirect effects would be the same as for baseline conditions. Mitigation measures would not be required for Alternative 4.

C.3 Noise

During the construction period and actual operation of the Olympic Venue events, temporary effects would result from traffic noise. In addition, the presence of spectators during pre-Olympic and Olympic events would result in temporary elevation of ambient noise levels within and directly adjacent to the proposed venue site.

C.3.a Effects Common To Alternatives 1, 2, and 3

Noise effects would be the same for each development alternative. As the magnitude of noise levels would vary little from alternative to alternative, these effects are discussed collectively.

C.3.a.1 Direct and Indirect Effects

During the construction period in 1994, it is estimated that a maximum of 15 trucks would be traveling on U.S. Highway 64 during the peak traffic hour due to proposed venue construction. Although a heavy truck is usually 3 dBA* louder at any distance than a bus, it is estimated that this noise effect would be less than the effect created by 100 buses and the 70-dBA distances described previously. At the proposed venue site, construction noise would depend on the activities underway at the time. Construction-related noise effects are considered temporary.

During the Olympic event in 1996, there would be nearly 100 buses per hour from the event traveling west on U.S. Highway 64 during the afternoon peak hour. In the Ocoee Gorge, overall traffic during this period will create noise which will affect receptors within 66 feet of the roadway centerline at a level of 70 dBA or greater. To the east of U.S. 411, receptors within 89 feet of the centerline will be affected at this level. To the west of U.S. 411, receptors within 85 feet of the roadway centerline will be affected at this level. It is estimated that the 70-dBA noise level during the event days would be 10 to 20 percent further from the roadway centerline than the existing 70 dBA noise level. The event would occur for a 3-day period; therefore, these would be temporary effects.

Fewer buses would be traveling toward the Little Frog Wilderness east of the proposed venue location than to the west. Therefore, noise level effects should be lower than those described above for sections of U.S. Highway 64 west of the proposed venue. The Big Frog Wilderness should receive no appreciable noise effect due to the event.

C.3.a.2 Cumulative Effects

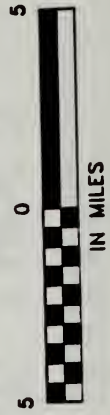
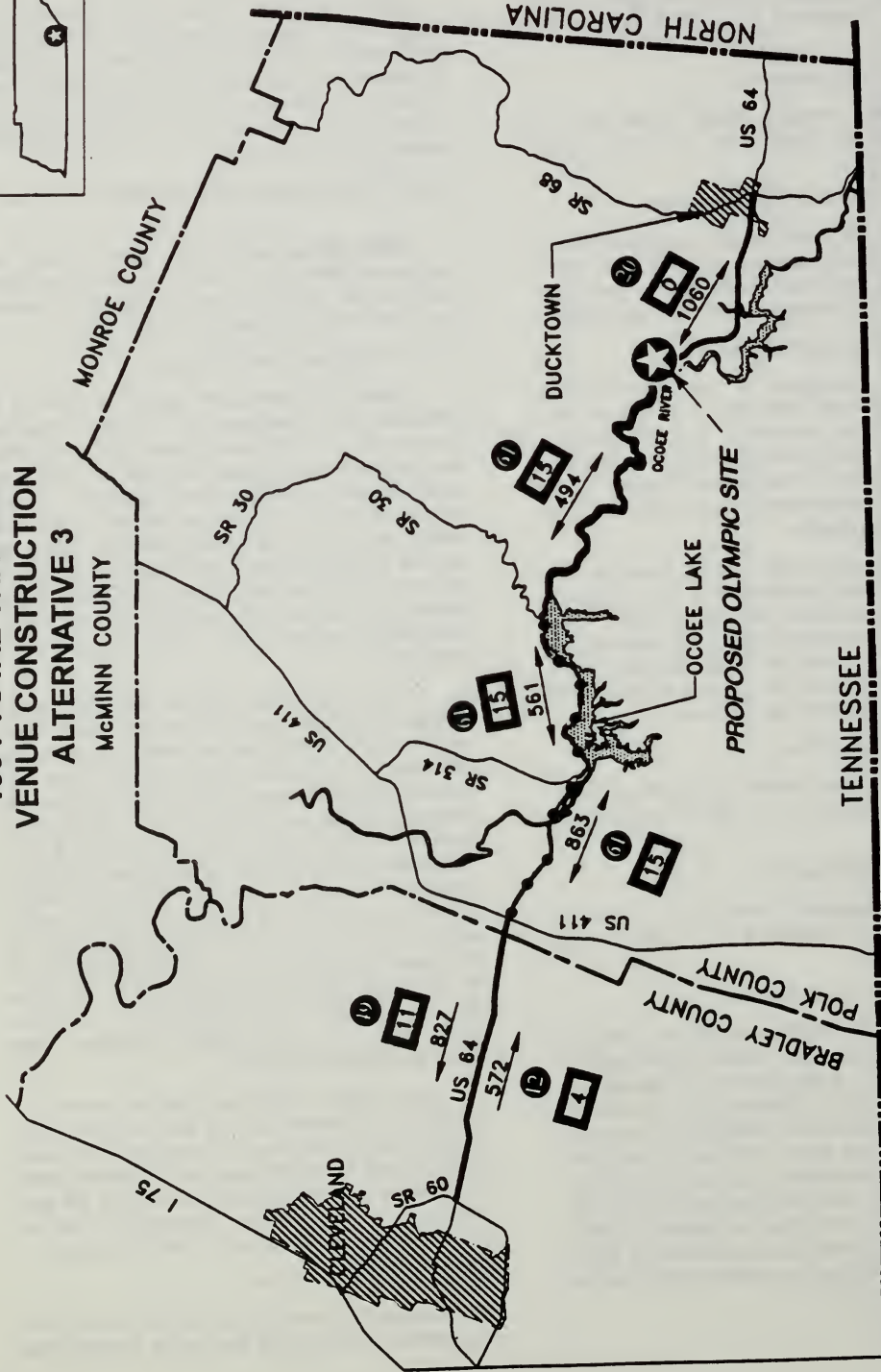
Increased recreational use of the Ocoee River is expected over the long term, with an associated

Figure IV. C. 2-8

1994 TOTAL TRAFFIC VENUE CONSTRUCTIVE 3 ALTERNATIVE 3

McMINN COUNTY

MONROE COUNTY



VENUE CONSTRUCTION TRAFFIC ONLY

CONSTRUCTION RELATED
PASSENGER VEHICLES
CONSTRUCTION RELATED
HEAVY VEHICLES

LOS

LOS A,B,C
LOS D
LOS E,F

LEGEND

VEHICLES PER P.M. PEAK HOUR
(JULY 1994 WEEKEND, INCLUDING
CONSTRUCTION RELATED TRAFFIC)

EACH DIRECTION
BOTH DIRECTIONS

increase in noise levels. This increase, however, is not expected to be as great an increase as predicted to occur during the event, and will be more dispersed. The long-term, cumulative effects from increased noise levels are not considered to be significant.

C.3.a.3 Mitigation Measures

Temporary construction effects can be mitigated by best construction management practices, scheduling of heavy equipment to avoid early morning and late evening hours and by the use of rubber-tired vehicles where appropriate. Equipment should be provided with adequate mufflers to minimize noise.

C.3.b Alternative 1

The majority of temporary effects, cumulative effects, and mitigation measures would be the same for Alternatives 1, 2, and 3. Construction for noise-related noise effects would occur for a longer period of time while pre-event conditions are being recreated.

C.3.c Alternative 2

The temporary effects, cumulative effects and mitigation measures for noise are the same for Alternatives 1, 2, and 3.

C.3.d Alternative 3 - Proposed Action

The temporary effects, cumulative effects and mitigation measures for noise are the same for Alternatives 1, 2, and 3.

C.3.e Alternative 4 - No Action

Baseline noise conditions would be expected to continue under the Alternative 4, and mitigation measures are not considered necessary.

C.4 Socioeconomics

The Economic Impact Forecasting System (EIFS) developed by the U.S. Army Corps of Engineers (1993) through the Army Construction Engineering Research Laboratory is used to assess socioeconomic effects. The EIFS system, and the results produced by it, have a high degree of reliability, and are widely accepted for analyses conforming to the requirements of the NEPA.

The EIFS model estimates a variety of direct and indirect socioeconomic effects in a defined geographic region, including change in business volume; change in personal income; change in employment; effect on local government resources and expenditures; effect on local housing; effect on local school systems; and change in local population. Direct effects are those associated with the actual change in population, income, or other variables

resulting from a proposed action. Indirect, or induced, effects result from an action's secondary or "ripple" effects in the local economy. These secondary results derive from the re-spending of dollars in the local economy which are directly attributable to proposed action. These effects are measured through regional multipliers (mathematical coefficients) which reflect the size and diversity of the local economy. Non-metropolitan areas with a smaller, less diverse economies such as the ROI have low multipliers and relatively small indirect effects. Total effects include both direct and induced effects. A more detailed description of the EIFS model is provided in Appendix G-4.

Once these effects are quantified, they are compared to a set of threshold values in order to evaluate their significance. The threshold values correspond to historic fluctuations in the local economy. Only effects which approach or exceed these historic patterns are considered to be potentially significant. In the EIFS system, the bounds of these fluctuations are referred to as rational threshold values (RTVs). The RTVs are derived from historic data. The local effect percent represents the resulting deviation from long-term trends, which should approach or exceed the RTVs for the effects to be deemed potentially significant. Effects which are below their RTV threshold values are not considered significant.

Similar assumptions were used, such as construction period and expenditure breakdowns, in the analysis for each alternative. The analysis shows the maximum annual change (including both direct and indirect effects) in local sales volume, employment, personal income, and population over the construction period and 2 selected years of operation. Effects have been analyzed for each construction alternative; and operations have been analyzed for 1995 (pre-Olympic events), and 1996 (the Olympic events and venue operation). Operational effects are based on official use projections and estimates of annual spending for the selected years. Construction activity produces short-term (or temporary), non-recurring effects which can be significant depending on the size of the project in relation to the size of the local economy. Operational effects are fairly regular, recurring effects resulting from the economic activity generated by the operations of a completed project. The tables in this section summarize the construction, operations and cumulative effects of the alternatives on the ROI economy.

The economic analysis presents the effects of developing, operating, and rehabilitating the Olympic whitewater course after the 1996 Games. To focus the analysis, a Region of Influence (ROI) was established to predict the social and economic impacts of holding the Olympic event. This analysis

does not consider the social and economic effects to the State as a whole, but is limited to a four-county ROI surrounding the proposed venue site.

The report "1996 Summer Olympic Games Canoe/Kayak Whitewater Slalom Event Feasibility Analysis" prepared by KPMG-Peat Marwick (1992) attempts to portray the economic costs and benefits to Polk County and to the state of hosting the event. As with any economic analyses, modeling is heavily relied upon to portray economic benefits. However, none of the available models can capture all economic aspects of an event of this magnitude. The model used to measure the effects of the Olympic event does not capture spin-off opportunities for visitors. For instance, models may predict how many visitors will require overnight accommodations, but the model does not predict how many visitors to the Olympics may visit other regional attractions while they are in the area.

With such attractions as the new Tennessee Aquarium, the Lookout Mountain complex, area Civil War battlefields and monuments, and other local attractions in southeast Tennessee and the nearby Pigeon Forge-Gatlinburg-Great Smoky Mountain National Park areas, increased visitation to these areas would be expected. However, models do not capture this type of information. Because of this inherent weakness in the economic model used by KPMG, the direct and indirect economic benefits underestimates the total economic benefits to the region and state.

Neither the KPMG nor the analysis presented in this EIS capture the total economic effects of events prior to the pre-Olympic events in 1995. As the popularity of the River has increased, so have the number of competitive events scheduled to be held on the Ocoee. As the number of events to be held increases, so does the economic effects. Therefore, any projections of the economic effects likewise change, making it impossible to capture the full effect that whitewater competition will have at the local, regional, or state level.

Between 1993 and pre-Olympic events in 1995, six regional, two national, and five international events are scheduled to be held on the lower Ocoee whitewater course (events in 1995 are scheduled to be held on the upper venue if course construction is completed). These events are expected to infuse at least \$1.8 million into the local economy not including spin-off opportunities such as visitor spending or the long-term economic impact associated with the Olympic site.

According to the economic feasibility analysis conducted by KPMG Peat Marwick (1992), the total estimated pre-Olympic returns are expected to be

\$69.8 million. The total direct and induced spending, for organizing and operating the pre-Olympic events alone, in 1993 is expected to total \$9.3 million; in 1994, \$16.6 million; and in 1995, \$25.7 million. KPMG also summarized the direct spending by visitors from 1993 through pre-Olympic events in 1995. KPMG estimates that \$3.4 million will be spent by visitors in 1993; \$5.8 million in 1994, and \$9.0 million in 1995. In 1996, direct and induced spending is expected to total \$13.8 million. These are basic projections and do not include tax benefits.

The analysis presented in this chapter is but one of two studies conducted to evaluate the potential economic effect of holding the Olympic event in Tennessee. The KPMG analysis did not go into the depth of the analysis presented in this EIS but evaluated the economic returns to the local, regional and state level. Since the study was prepared specifically to disclose the effect of the proposed action, effects arising from implementation of Alternatives 1 and 2 can not be discerned. Nevertheless, KPMG presents relevant data that supports the effects disclosed for the ROI and forecasts effects to the state level instead of just the local level.

The KPMG study also assumed post-Olympic individual and commercial use of the upper section of the Ocoee River. The study included here does not consider post-Olympic impacts except in the reasonably foreseeable development scenarios and then assumes that the use is for competitive events only.

While the two analyses differ in the reported impact the Olympics will have, the effects disclosed herein are for a specific area defined as the ROI. Therefore, spin-off opportunities to other areas of the state are not captured. The analysis presented here should be viewed as capturing local economic effects. Some of the effects may appear to be insignificant within the ROI but may, when viewed on a larger basis, have significant impact. Conversely, some locally significant effects may be insignificant on a larger basis.

The economic analysis presented here is localized to show the effects on the area immediately surrounding the proposed venue location. Looking at a larger scale could dilute the effects and not truly reflect the direct and indirect effects upon the local area.

C.4.a Effects Common To Alternatives 1, 2, and 3

The socioeconomic issues associated with construction and operation of the proposed Olympic Venue are discussed for Alternatives 1, 2, and 3 in the sections that follow.

C.4.a.1 Direct and Indirect Effects

The following is a discussion of construction and operational effects of Alternatives 1, 2, and 3.

Construction Effects

The effects resulting from activity during the anticipated venue construction period would be less if the construction period was longer. A precise schedule would be developed after detailed design and construction contract preparation is completed in late 1993. The anticipated schedule assumes efficiencies in the design, procurement, and construction of various project components, enabling venue construction to start in 1994 and be completed prior to the Olympic events in 1996. Some labor expenditures would occur with removal of temporary facilities following the Olympic events, but these costs would not be a significant part of the total expenditure estimates. The removal of temporary facilities is included in the estimates of total construction costs.

Assumptions based on construction projects are supplied by EIFS for the modeling process and forecasts. Construction expenditure assumptions were taken from the venue Design Report (USDA, 1993). The baseline year for the EIFS model system is 1987, which is adjusted to 1992 dollars with a price deflator. Table IV.C.4-1 presents the construction expenditure assumptions.

Economic effects are generated both by construction activity, and by changes in operational expenditure and employment levels from the constructed facilities. While the construction effects are short-term, occurring only during the construction period, effects from changes in operational expenditure and employment levels tend to be long-term, recurring effects.

Table IV.C.4-2 presents the construction-effect forecast produced with the EIFS model on the basis of assumptions and estimated construction costs for Alternatives 1, 2, and 3. Table IV.C.4-3 presents an analysis of the construction and operation significance of the four main effect categories: business volume, employment, income, and population. The effects represent the maximum annual effect on the local economy due to the construction expenditures and activity associated with the alternatives.

Operational Effects

From a pre-Olympics baseline, the only change in operational effects following facilities construction would result from the event itself and the continued use of the site for pre-Olympic training and trials, the event itself, and the continued use of the Olympic Venue for competitive recreational activities. Other activities in the CNF and on the Ocoee

River would be essentially the same. Thus, operational effects from the Olympic Venue after construction, when compared to pre-Olympics baseline conditions, would be relatively small in comparison to overall ROI economic activity. These effects are analyzed below, and indicated in Table IV.C.4-4.

In order to evaluate the effects of changes in operational expenditures and employment from continued use of the Ocoee River Olympic Venue for recreational purposes, the incremental changes must be compared to a baseline level of operational activity. Only incremental differences in expenditures and employment between pre-Olympic operations and operational levels are analyzed. An examination of two selected years and the pre-Olympic conditions determined that the primary operational difference would involve increased recreational use of the Ocoee River. The two years are 1995 and 1996.

The year 1995 is estimated to have a positive incremental change in expenditures of \$4.9 million due to pre-Olympic activities, not including the construction effects reported above. The year 1996 is estimated to have a positive incremental change in expenditures of \$5.94 million due to Olympic activities and other use of the venue, which would be completed and available for non-Olympic recreational use after the Olympics. Secondary incremental changes include changes in TVA power revenues, increased direct and indirect local employment, population, utility demands, land development, and local government revenues and expenditures.

Compared to the threshold values previously explained, all of the effects are likely to be small in comparison to the RTVs for annualized local sales volume, employment, personal income, and population. The operational effects due to the recreational use of the venue would not be significant, as indicated in Table IV.C.4-3. Effect percentage values are much less than the RTVs, well under 1 percent for each category.

Demographic Effects

Demographic characteristics of the resident population in the ROI are not anticipated to experience a significant long-term effect from the proposed project. Temporary construction workers may be drawn from outside the ROI to work on construction projects associated with the project, particularly if union labor or a prime contractor from outside the region are employed for the project. It is anticipated that most of the project work force would be drawn from within the area labor market (including Chattanooga and Hamilton County), minimizing any effect due to immigration of new

TABLE IV.C.4-1
Construction Expenditure Assumptions

	Alternative 1	Alternative 2	Alternative 3
Price Index ^a			
Baseline Year (1987)	100.0	100.0	100.0
Output and Incomes (1992)	122.8	122.8	122.8
Local Construction Expenditures (1992)	113.1	113.1	113.1
Expenditure Distribution			
Labor	39.97%	40.20%	37.85%
Materials	26.43%	26.43%	24.97%
Other (Overhead and Profit)	<u>33.60%</u>	<u>33.28%</u>	<u>37.18%</u>
Total	100.00%	100.00%	100.00%
In-migrating Construction Workers ^b	30.0%	30.0%	30.0%

Source: U.S. Army Corps of Engineers, 1993.

^a Price Index numbers reflect the influence of changes in price levels (inflation) over time. The values provided in this table are in 1987 dollars. Prices in 1992 for income and output were nearly 23 percent higher than the same items in 1987. The effect of price level changes are not constant across all sectors of the economy, consequently, the rate of inflation in the construction sectors over the five year period was smaller than for output and income (CPI).

^b Percentage of construction workers from outside of the ROI.

Notes: Alternative 4, No Action was not modeled.

Index numbers reflect the influence of changes in price levels (inflation) over time. The values provided in this table are in 1987 dollars. Prices in 1992 for income and output were nearly 23 percent higher than the same items in 1987. The effect of price level changes are not constant across all sectors of the economy; consequently, the rate of inflation in the construction sectors over the five year period was smaller than for output and income.

TABLE IV.C.4-2
Construction Effect Forecast Summary for Alternatives

Effect	Alternative 1	Alternative 2	Alternative 3
Local Sales Volume Change			
Direct	\$3,081,000	\$4,159,000	\$4,403,000
Total	\$6,100,000	\$8,234,000	\$8,718,000
Local Employment Change			
Direct	27	36	38
Total	159	215	227
Local Income Change			
Direct ^a	\$377,000	\$509,000	\$539,000
Total (Place of Residence)	\$3,030,000	\$4,101,000	\$4,333,000
Local Population	72	98	103
Number of School Children	13	18	19
Demand for Housing			
Rental Units	32	43	45
Owner-Occupied Units	0	0	0
Local Government Expenditures	\$244,000	\$330,000	\$348,000
Local Government Revenues ^b	\$341,000	\$461,000	\$487,000
Net Local Fiscal Effect ^c	\$97,000	\$131,000	\$139,000
Employee Relocations	32	43	45

Sources: U.S. Army Corps of Engineers, 1993.

^a Direct local income refers to the salaries of the construction workers totaled.

^b The EIFS model calculates government revenues from both sales taxes and property taxes indigenously, based on changes in local business activities.

^c Net Local Fiscal Effect is the difference between incremental revenues accruing to local governments due to the project, minus additional expenditures resulting from the project.

Notes: Alternative 4, No Action was not modeled.

TABLE IV.C.4-3
Socioeconomic Assessment Matrix - Construction and Operation Effects Within the ROI

Category	CONSTRUCTION EFFECTS				OPERATION EFFECTS				CUMULATIVE EFFECTS		
	Maximum Annual Effect	Local Effect Percent	Rational Threshold Value	Assessment	Maximum Annual Effect		Local Effect Percent			Rational Threshold Value	
					1995	1996	1995	1996		1995	1996
Alternative 1											
Total Change in Local Sales Volume	\$3,081,000	4,540	8,632	Not Significant	\$9,800,000	7,067,000	0.339	0.244	8,632	Not Significant	\$19,948,000
Total Change in Local Employment	159	14,601	5,785	Significant	84	61	0.148	0.109	5,785	Not Significant	304
Total Change in Local Income by Place of Residence	\$3,030,000	5,988	5,678	Significant	\$1,186,000	\$841,000	0.069	0.049	5,678	Not Significant	\$5,057,000
Total Change in Local Population	72	3,902	1,355	Significant	0	0	0.000	0.000	1,355	Not Significant	72
Alternative 2											
Total Change in Local Sales Volume	\$4,159,000	6,128	8,632	Not Significant	\$9,800,000	\$7,067,000	0.339	0.244	8,632	Not Significant	\$21,026,000
Total Change in Local Employment	215	19,743	5,785	Significant	84	61	0.148	0.109	5,785	Not Significant	360
Total Change in Local Income by Place of Residence	\$4,101,000	8,104	5,678	Significant	\$1,186,000	\$841,000	0.069	0.049	5,678	Not Significant	\$6,128,000
Total Change in Local Population	98	5,312	1,355	Significant	0	0	0.000	0.000	1,355	Not Significant	98
Alternative 3											
Total Change in Local Sales Volume	\$4,403,000	6,487	8,632	Not Significant	\$9,800,000	\$7,067,000	0.339	0.244	8,632	Not Significant	\$21,240,000
Total Change in Local Employment	227	20,845	5,785	Significant	84	61	0.148	0.109	5,785	Not Significant	372
Total Change in Local Income by Place of Residence	\$4,333,000	8,562	5,678	Significant	\$1,186,000	\$841,000	0.069	0.049	5,678	Not Significant	\$6,360,000
Total Change in Local Population	103	5,583	1,355	Significant	0	0	0.000	0.000	1,355	Not Significant	103
Alternative 4											
Total Change in Local Sales Volume	\$0	0	8,632	Not Significant	\$0	\$0	0.000	0.000	8,632	Not Significant	\$0
Total Change in Local Employment	0	0	5,785	Not Significant	0	0	0.000	0.000	5,785	Not Significant	0
Total Change in Local Income by Place of Residence	\$0	0	5,678	Not Significant	\$0	\$0	0.000	0.000	5,678	Not Significant	\$0
Total Change in Local Population	0	0	1,355	Not Significant	0	0	0.000	0.000	1,355	Not Significant	0

Sources: Based on U.S. Army Corps of Engineers, 1993.

Note: Cumulative effects are calculated to include direct and indirect effects.

TABLE IV.C.4-4
Operation Effect Forecast Summary for Selected Years
For Alternatives 1, 2, and 3^a

Effect	1995	1996
Local Sales Volume Change		
Direct	\$4,900,000	\$6,113,000
Total (Direct, Indirect, Induced)	\$9,800,000	\$7,067,000
Local Employment Change		
Direct	42	29
Total	84	61
Local Income Change		
Direct	\$599,000	\$402,000
Total (Place of Residence)	\$1,186,000	\$841,000
Local Population	0	0
Number of School Children	0	0
Demand for Housing		
Rental Units	0	0
Owner-Occupied Units	0	0
Local Government Expenditures	\$89,000	\$67,000
Local Government Revenues	\$117,000	\$85,000
Net Local Fiscal Effect	\$28,000	\$18,000
Employee Relocations ^b	0	0

Note: ^a Alternative 4, No Action was not modeled.

^b Assumes all employment derived from local hires, therefore no immigration impacts.
Sources: U.S. Army Corps of Engineers, 1993.

workers not directly employed by ACOG or its contractors.

The proposed project would involve new employment on a temporary basis for construction prior to, and during removal of facilities after the Olympic events, with some permanent employment resulting from increased recreational activities over time. It is anticipated that non-local construction employees would not relocate with their families to the region on a permanent basis due to the proposed project. Following the construction activity, population changes are not expected to be significantly more than would occur without the project.

Nonresident Population

For each of the three alternative concepts, the site-related population consists of venue participants, facilitators, and spectators. Venue participants consist of those athletes, coaches judges, ACOG representatives, and members of ICF and other officials. Venue facilitators include broadcast personnel, the media, safety and security personnel, and all other sanitation, maintenance, and service personnel. Venue spectators consist of the persons with tickets attending the event, invited guests and other special guests (VIPs), family members of the participants, and spectators and vendors.

Within the ROI, there are more than 5,500 lodging units, campsites, and other units held for seasonal and recreational use. A peak population estimate for these units is an indicator of the potential effect which visitors attending the Olympic events on the Ocoee River would have on the area. As detailed below, the temporary lodging potential in the ROI could accommodate up to 16,570 persons. This does not include participants and other team members and guests staying at the Lee College Olympic Village site in Cleveland. This population component has been estimated at 435 persons, according to ACOG.

The peak visitor population present in hotels, motels, and campsites is estimated based on assumptions of lodging unit and campsite occupancy and the average number of persons per visiting group. Assuming a peak occupancy factor of 97 percent and an average of 2.7 persons per group for attendance at the proposed Olympic events staying in hotels, motels, and campsites, this nonresident population component could reach 8,137 persons. The potential peak visitor population by county is estimated at 1,728 in Polk County; 3,583 in Bradley County; 1,469 in Cherokee County; and 1,357 in Fannin County. Assuming a peak occupancy factor of 90 percent and an average of 3.5 persons per unit during the Olympic events for units held for sea-

sonal, recreational, or occasional use, this population component would peak at an estimated 444 in Polk County; 205 in Bradley County; 3,991 in Cherokee County; and 3,793 in Fannin County, for a total of 8,433 persons. This analysis assumes that many of the units held for seasonal, recreational, or occasional use would be made available to accommodate visitors for the events held on the Ocoee River.

Ocoee River Recreational Users

The number of recreational users of the Ocoee River has increased substantially in recent years. Projections of commercial utilization on the lower Ocoee were recently prepared by the Tennessee Department of Finance and Administration (1993). These projections, shown in Table IV.C.4-5, indicate that paying customers using the river in 1993 could range from a low of about 136,472 to a high of 143,990. With the addition of nonpaying commercial users and non-commercial users based on reported usage between 1988 and 1992, total potential usage can be projected. This would range from a low of about 224,600 annually to a high of 235,200 in 1996.

Continued recreational use of the upper Ocoee River would be limited in the future following the Olympic events. TVA has committed water release days only for IOC practices, pre-Olympic events, and the Olympic event. No other water release commitments have been made.

The continued use of the venue would result in an increment of the total baseline projections of potential users of the Ocoee River. The additional per capita, daily expenditures in the ROI made by this potential user population generates the additional socioeconomic benefits associated with the continued use of the venue.

Changes in Economic Activity

The effects on business volume resulting from the Ocoee River Olympic Venue construction activity and expenditures are measured by EIFS as annual changes in sales volume in the ROI (Table IV.C.4-3). The change in the amount of local sales volume is anticipated to be an incremental gain as rafting on the lower stretch increases and competitive events take place on the upper stretch attracting spectators and other passive recreationists. The total ROI effects forecast over the construction period vary from \$6.1 to \$8.7 million per year. The primary, or direct, ROI effects in the forecast range from \$3.081 to \$4.403 million per year during the period of construction. The operational activities of the pre-

TABLE IV.C.4-5
Projections for Recreational Utilization of the Ocoee River

Year	Paying Commercial Customers			All Users		
	Low Projection	Middle Projection	High Projection	Low Projection	Middle Projection	High Projection
1993	136,472	140,231	143,990	192,178	197,471	202,765
1994	144,363	148,122	151,881	203,290	208,583	213,877
1995	152,034	155,793	159,552	214,092	219,385	224,679
1996	159,485	163,245	167,004	224,584	229,879	235,173

Source: Newhoss, 1992

Olympic events in 1995 and the Olympic events in 1996 would also affect business volume. The total ROI operational effects forecast are \$9.8 million in 1995, and \$7.067 million in 1996. The primary, or direct, ROI operational effects in the forecast range from \$4.9 million in 1995 to \$6.113 million during the Olympic year 1996.

Changes in Local Employment

The effects on local employment resulting from the Ocoee River Olympic Venue construction activity and expenditures are measured by EIFS as a change in average annual employment in the ROI (Table IV.C.4-3). The total effects forecast over the 1-year period vary from 159 to 227 jobs, including indirect or induced employment. The primary, or direct, effects are forecast at 27 jobs under Alternative 1, 36 jobs under Alternative 2, and 38 jobs under Alternative 3 during the period of construction. The total ROI operational effects forecast are 84 jobs in 1995, and 61 jobs in 1996. The primary, or direct, ROI operational effects in the forecast are to be 42 jobs in 1995, and 29 jobs in 1996.

Changes in Income

The direct local income (construction workers) effect resulting from the construction activity and expenditures is forecast to be \$377,000 under Alternative 1, \$509,000 under Alternative 2, and \$539,000 under Alternative 3 during the construction phase (Table IV.C.4-2). The total local income change, by place of residence within the ROI, is forecast to be \$3.03 million under Alternative 1, \$4.1 million under Alternative 2, and \$4.33 million under Alternative 3 during construction. The total ROI operational effects on local income forecast are \$1,186,000 in 1995 and \$841,000 in 1996. The primary, or direct, ROI operational effects are forecasted to be \$599,000 in 1995, and \$402,000 in 1996.

Housing

The demand for housing has not been exceeding the supply in the ROI and Polk County. New households attributable to the proposed project and continued use of the Olympic Venue facilities probably would not be significant. The housing market would be likely to satisfactorily meet demand for rental and owner-occupied units by the project population within a 1-hour commuting distance. The in-migrating workers during the construction phase are forecast to generate demand for 32 rental units under Alternative 1, 43 rental units under

Alternative 2, and 45 rental units under Alternative 3. It has been assumed that employment demand for operational activities would be met from persons within the ROI and not from immigration; therefore, no additional population-related demands are attributed to the slightly increased employment opportunities presented by operational activities.

C.4.a.2 Cumulative Effects

Cumulative socioeconomic effects include a temporary increased demand for public services and facilities, primarily utilities. Employment and income conditions would be positively affected, as some new jobs would be filled by local residents either directly or through provision of secondary employment due to increased economic activity.

C.4.a.3 Mitigation Measures

The socioeconomic effects related to Olympic Venue construction and operation are forecasted to be positive; therefore, mitigation measures are not provided.

C.4.b Alternative 1

Socioeconomic effects of Alternative 1 on population, economic activity, local employment, income and housing are discussed below.

C.4.b.1 Direct and Indirect Effects

Resident Population

The direct population effect resulting from the construction activity and expenditures is anticipated to be 72 persons. The total population change, by place of residence (within the ROI), is forecast to be 159 during construction. The construction of the proposed Olympic Venue under Alternative 1 would have an effect on population in the ROI. The positive RTV calculated by EIFS from data over the past 20 years in the ROI is 1.355 percent. Therefore, the calculated local effect for Alternative 1 of 3.902 percent is significant.

Economic Activity

The direct, indirect, and total effects forecast over the period beginning in 1994 through completion of the event in 1996 under Alternative 1 for local sales volume is \$3.081 million. The positive RTV calculated by EIFS from data over the past 20 years in the ROI is 8.632 percent. Therefore, the calculated local effect percent for this alternative of 4.54 percent is not significant.

Local Employment

The construction of the proposed Olympic Venue under Alternative 1 would have a maximum employment effect of 159 workers in the ROI. The primary effect would include 27 new jobs. The

positive RTV calculated by EIFS from data over the past 20 years in the ROI is 5.785 percent. Therefore, the calculated local effect for this alternative of 14.601 percent is significant.

Income

The direct local effect resulting from the construction activity and expenditures is anticipated to be \$377,000 under Alternative 1 during the construction phase. The total local income change, by place of residence (within the ROI), is forecast to be \$3.03 million during construction. The construction of the Olympic Venue under Alternative 1 would have an effect on personal income in the ROI. The positive RTV calculated by EIFS from data over the past 20 years in the ROI is 5.678 percent. Therefore, the calculated local effect for Alternative 1 of 5.988 percent is significant. The fiscal effects forecast for local governments in the ROI due to Alternative 1 during the construction phase will involve an increase in revenues of \$341,000, with an expenditure increase of \$244,000. This results in a net fiscal effect of \$97,000 over the construction period. Therefore, the net fiscal effect would be positive.

Housing

New households attributable to Alternative 1 and continued use of the Olympic Venue facilities probably would not be significant. The housing market would likely satisfactorily meet demand for rental and owner-occupied units by the project population within a 1-hour commuting distance. The in-migrating workers during the construction phase are forecast to generate demand for 32 rental units under Alternative 1.

C.4.b.2 Cumulative Effects

Cumulative effects would be the same as those common to Alternatives 1, 2, and 3 (see Section C.4.a.2).

C.4.b.3 Mitigation Measures

No mitigation measures are necessary due to the positive and limited characteristics of potential socioeconomic effects.

C.4.c Alternative 2

Socioeconomic effects resulting from Alternative 2 are described in terms of population, economic activity, local employment, income and housing.

C.4.c.1 Direct and Indirect Effects

Resident Population

The direct population effect resulting from the construction activity and expenditures is 98 persons

under Alternative 2. The total population change, by place of residence (within the ROI), is forecast to be 215 during construction. The construction of the Olympic Venue under Alternative 2 would have an effect on population in the ROI. The positive RTV calculated by EIFS from the data over the past 20 years in the ROI is 1.355 percent. Therefore, the calculated local effect for Alternative 2 of 5.312 percent is significant.

Economic Activity

The direct, induced, and total effects forecast over the 1-year period under Alternative 2 for local sales volume if \$4.159 million. The positive RTV calculated by EIFS from data over the past 20 years in the ROI is 8.632 percent. Therefore, the calculated local effect percent for this alternative of 6.128 percent is not significant.

Local Employment

The construction of the Ocoee River Olympic Venue under Alternative 2 would have a maximum employment effect of 215 workers in the ROI. Under this alternative, primary effects would result in 36 new jobs. The positive RTV calculated by EIFS from data over the past 20 years in the ROI is 5.785 percent. Therefore, the calculated local effect for this alternative of 19.473 percent is significant.

Income

The direct local income effect resulting from the construction activity and expenditures is anticipated to be \$509,000 under Alternative 2 during the construction phase. The total local income change, by place of residence (within the ROI), is forecast to be \$4.1 million during construction. The construction of the Olympic Venue under Alternative 2 would have an effect on personal income in the ROI. The positive RTV calculated by EIFS from data over the past 20 years in the ROI is 5.678 percent. Therefore, the calculated local effect for Alternative 2 of 8.104 percent is significant. The fiscal effects forecast for local governments in the ROI due to Alternative 2 of 8.104 percent is significant. The fiscal effects forecast for local governments in the ROI due to Alternative 2 during the construction phase will involve an increase in revenues of \$461,000, with an expenditure increase of \$330,000. This results in a net fiscal effect of \$131,000 over the construction period. Thus, the net fiscal effect would be positive.

Housing

New households attributable to Alternative 2 and continued use of the Olympic Venue facilities probably would not be significant. The housing market would be likely to satisfactorily meet demand for rental and owner-occupied units by the

project population within a 1-hour commuting distance. The in-migrating workers during the construction phase are forecast to generate demand for 43 rental units under this alternative.

C.4.c.2 Cumulative Effects

Cumulative effects would be the same as those common to Alternatives 1, 2, and 3 (see Section C.4.a.2).

C.4.c.3 Mitigation Measures

No mitigation measures are necessary due to the positive and limited characteristics of potential socioeconomic effects.

C.4.d Alternative 3 - Proposed Action

Socioeconomic effects associated with maintaining some permanent facilities under Alternative 3 are described in terms of population, economic activity, local employment, and income.

C.4.d.1 Direct and Indirect Effects

The direct population effect resulting from the construction activity and expenditures is forecast to be 103 persons under Alternative 3 during the construction phase. The total population change, by place of residence (within the ROI), is forecast to be 227 during construction. The construction of the Ocoee River Olympic Venue under Alternative 3 would have an effect on population in the ROI. The positive RTV calculated by EIFS from data over the past 20 years in the ROI is 1.355 percent. Therefore, the calculated local effect for Alternative 3 of 5.583 percent is significant.

The direct, induced, and total effects forecast over the 1-year period under Alternative 3 for local sales volume is \$4.403 million. The positive RTV calculated by EIFS from data over the past 20 years in the ROI is 8.632 percent. Therefore, the calculated local effect percent for this alternative of 6.487 percent is not significant.

The construction of the Olympic Venue under Alternative 3 would have a maximum employment effect of 227 workers in the ROI. The primary effects of this alternative would result in 38 new jobs. The positive RTV calculated by EIFS from data over the past 20 years in the ROI is 5.785 percent. Therefore, the calculated local effect for this alternative of 20.845 percent is significant.

Income

The direct local income effect resulting from the construction activity and expenditures is shown to be \$539,000 under Alternative 3 during the construction phase. The total local income change, by place of residence (within the ROI), is forecast to be \$4.33 million during construction. The construction

of the Olympic Venue under Alternative 3 would have an effect on personal income in the ROI. The positive RTV calculated by EIFS from data over the past 20 years in the ROI is 5.678 percent. Therefore, the calculated local effect for Alternative 3 of 8.562 percent is significant. The fiscal effects forecast for local governments in the ROI due to Alternative 3 during the construction phase will involve an increase in revenues of \$487,000, with an expenditure increase of \$348,000. This results in a net fiscal effect of \$139,000 over the construction period. Thus, the net fiscal effect would be positive.

Housing

New households attributable to Alternative 3 and continued use of the Olympic Venue facilities probably would not be significant. The housing market would be likely to satisfactorily meet demand for rental and owner-occupied units by the project population within a 1-hour commuting distance. The in-migrating workers during the construction phase are forecast to generate demand for 45 rental units under Alternative 3.

C.4.d.2 Cumulative Effects

Cumulative effects would be the same as those common to Alternatives 1, 2, and 3 (see Section C.4.a.2).

C.4.d.3 Mitigation Measures

No mitigation measures are necessary due to the positive and limited characteristics of potential socioeconomic effects.

C.4.e Alternative 4 - No Action

Direct and indirect effects are not expected and baseline conditions would be mirrored. Cumulative effects associated with the no-action alternative are not expected, and mitigation measures would therefore not be required.

C.5 Land Use

Alternatives 1, 2, and 3 have been proposed for development of the site to accommodate the 1996 Olympic Venue. The land uses which comprise each alternative are primarily recreational, administrative, and commercial. Recreational uses include the competitive channel and spectator viewing amenities. Administrative uses include the Olympic facilities, athlete services, management offices, broadcast compound, and VIP areas. Commercial uses are limited and include portions of the spectator services areas and vendor sales facilities. Table IV.C.5-1 presents the assessment matrix for land use.

TABLE IV.C.5-1
Land Use Compatibility Assessment Matrix

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
<u>Venue Operations</u>				
Land Use Regulations	Compatible ^(a)	Compatible	Compatible	Compatible
Recreational Land Use	Slight Incompatibility	Slight Incompatibility	Slight Incompatibility	Compatible
Transportation Land Use	Compatible	Compatible	Compatible	Compatible
<u>Immediate Post Olympic</u>				
Land Use Regulations	Compatible	Compatible	Compatible	Compatible
Recreational Land Use	Compatible	More Intensive ^(b)	More Intensive	Compatible
Transportation Land Use	Compatible	More Intensive	More Intensive	Compatible

^a Compatible land uses are those that are harmonious when located in close proximity to each other.

^b More intensive land use refers to development which increases in degree or quantity over time.

C.5.a Effects Common To Alternatives 1, 2, and 3

The 1996 Olympic Venue would not result in significant effects on adjacent land uses, as the project is recreational in concept, and is compatible with adjacent land uses. All new construction and removal of temporary facilities would occur within the boundaries of CNF. No conflicts have been identified with local land use plans, policies, or land development regulations.

C.5.a.1 Direct and Indirect Effects

Land use effects were assessed with respect to the operational aspects of the Olympic Venue (all facilities in place) and by evaluating the compatibility of land uses which would remain in place post-Olympics.

Immediate post-Olympic land use on-site would vary from alternative to alternative, while during the venue period (1996), each alternative is essentially the same. Therefore, land use effects common to all action alternatives are only relevant for the venue operational period.

On-site and adjacent existing land uses consist of active recreational (swimming and intermittent rafting/canoeing/kayaking when water is available and hiking), passive recreational (sun-bathing and picnicking), and transportation (U.S. Highway 64 and Old Copper Road). For each alternative, approximately 250,000 square feet of Olympic program requirements new construction or improvements are proposed (USDA, 1993).

As the completed Olympic Venue would be considered recreational, only minor incompatibilities (commercial uses) with adjacent existing land uses would result. The location of administrative and commercial activities related to the venue would not be compatible with adjacent active and passive recreational uses. Proposed recreational uses associated with the venue would be compatible with existing recreational land use, but would result in a temporary elevated intensity of use during the venue operational period.

C.5.a.2 Cumulative Effects

Cumulative effects of land use associated with venue operations could include additional temporary commercial uses if permitted (primarily concessionaires) proximate to the site, and increased use of the lower Ocoee River and appurtenant recreational facilities.

C.5.a.3 Mitigation Measures

As the aforementioned effects are temporary and of short duration, no mitigation measures are proposed.

C.5.b Alternative 1

The site would be returned to near baseline conditions under Alternative 1, which would be compatible with adjacent land uses. The parking area would be located adjacent to U.S. Highway 64 and would be a compatible transportation-related use. No cumulative effects to land use would result from this alternative, and no mitigation measures would be necessary for Alternative 1.

C.5.c Alternative 2 and Alternative 3 - Proposed Action

The land use effects analysis for Alternatives 2 and 3 are similar due to the same type of uses proposed and therefore, are combined and presented below.

C.5.c.1 Direct and Indirect Effects

Retention of the competitive channel would result in increased intensity of competitive recreational use of the upper Ocoee River and appurtenant facilities on an intermittent basis. Indirect effects could include development of expanded parking and recreational facilities in the vicinity of the site to accommodate additional users. Other indirect effects could include commercial development along sections of U.S. Highway 64 and in adjacent communities to include rafting outfitters, restaurants, and lodging facilities.

The day use building, if used as an information center, interpretive center, or training facility, would be compatible with the recreational use of the adjacent area. Pure commercial use of this structure would not be compatible. Both the upper bridge, parking area, and lower pedestrian bridge (Alternative 3) would not result in any incompatibility.

C.5.c.2 Cumulative Effects

Cumulative effects could result in increased traffic and pedestrian utilization of the site, resulting in greater peak use of facilities.

C.5.c.3 Mitigation Measures

Effects of increased utilization of the site could be mitigated through judicious scheduling of water releases in 1995 and 1996, and the implementation of planning and design controls for parking and related facilities to accommodate projected passive recreationists and spectators of competitive events.

C.5.d Alternative 4 - No Action

The no-action alternative would not result in any site development. Direct and indirect effects would mirror baseline conditions. Cumulative effects associated with the no-action alternative are

not expected, and mitigation measures would therefore not be required.

C.6 Public Facilities

The sections addressing potential consequences on public facilities and services of the four alternatives include law enforcement, fire protection, emergency medical and health services, education, and utilities. Utility systems addressed include potable water supply, wastewater collection and treatment, solid waste collection and disposal, electric power supply, and telecommunications. The results are summarized in the assessment matrix for public facilities and services (Table IV.C.6-1).

C.6.a Effects Common To Alternatives 1, 2, and 3

The following is a discussion of the environmental effects common to Alternatives 1, 2, and 3, and includes an assessment of law enforcement, fire protection, emergency medical and health services, education, and utility systems (water supply, wastewater, solid waste, and electric power).

C.6.a.1 Direct and Indirect Effects

Law Enforcement

Law enforcement services will be provided by several agencies. Law enforcement agencies in the region have executed memoranda of understanding providing for mutual assistance and response. The CNF and other law enforcement agencies would be coordinated to provide personnel for public safety and law enforcement during the Olympic events. It is not anticipated that law enforcement services in the ROI would be significantly affected by any of the alternatives or the continued use of the Olympic Venue on the Ocoee River for recreation.

During the Olympic events, the CNF Federal law enforcement officers would be available for security operations at the venue site. Each of these officers has a vehicle and is certified for Mountain Rescue. TVA Public Safety Unit officers in the region, and the Tennessee Wildlife Resource Department wildlife officers would provide added law enforcement personnel.

All security operations related to the prevention of terrorist activities would be organized and managed in the Cleveland, Tennessee FBI office. Additional FBI agents are anticipated to be available for law enforcement and security operations. The TBI would continue to supplement state and local law enforcement personnel with assistance in investigations of criminal activities.

The Tennessee Highway Patrol, North Carolina Highway Patrol, and Georgia Highway Patrol would deploy officers, primarily to patrol state and federal

roads. Military police personnel from the Tennessee National Guard could also be made available for traffic control duties or perimeter security operations. During the construction phase and the Olympic events, the Tennessee Emergency Management policy, which permits the State to close a highway to prevent a potential commercial truck accident which could result in a hazardous or toxic material spill, may be enforced. This action would close part of U.S. Highway 64 to commercial traffic carrying hazardous or toxic materials.

Fire Protection

A Mutual Aid Association of 25 different fire departments in the three-state area has the capability to provide equipment and personnel for fire and emergency response for the Olympic events. It is not anticipated that fire protection services in the ROI will be significantly affected by any of the alternatives or the continuation of existing use of the Olympic Venue on the Ocoee River for recreation.

Emergency Medical and Health Services

It is not anticipated that emergency medical and health services in the ROI would be significantly affected by any of the alternatives or continued use of the Olympic Venue on the Ocoee River for recreation.

Education

The forecasts indicate that there would be a maximum increase of 13 school children in the ROI during the 1994-95 school year under Alternative 1 during the construction period. This figure rises to 18 under Alternative 2, and to 19 under Alternative 3 (Table IV.C.6-1). It is not anticipated that public education services in the ROI will be significantly affected by any of the proposed alternatives or continued use of on the Ocoee River for recreational purposes.

Potable Water Supply

The site of the proposed whitewater rafting venue at the Ocoee River is located within the Ocoee Utility District. However, the potable water distribution system does not currently serve the proposed site. One well with a pumping capacity of 20 gpm would be constructed near Williams Creek (USDA, 1993). Water would be transported through polyvinyl chloride (PVC) piping to a 20,000-gallon, welded-steel stand pipe for water treatment and storage. PVC pipe would then transport water from the storage facility to the spectator facilities and the athlete support area.

TABLE IV.C.6-1
Resource Assessment Matrix: Effects On Public Facilities and Services

Effects On Public Services						
Year	Alternative	Law	Fire	Medical	Education^a (Students)	Impact Assessment
1995	1	Negligible	Negligible	Negligible	13	Not Significant
	2	Negligible	Negligible	Negligible	18	Not Significant
	3	Negligible	Negligible	Negligible	19	Not Significant
	4	None	None	None	None	Not Significant
1996	1	Temporary	Temporary	Temporary	Temporary	Not Significant
	2	Temporary	Temporary	Temporary	Temporary	Not Significant
	3	Temporary	Temporary	Temporary	Temporary	Not Significant
	4	None	None	None	None	Not Significant

^aIndicates forecasted increase in the number of students.

New commercial development potentially occurring offsite would be served by the Ocoee Utility District or independently by wells. Additional campsites at any of the existing developed recreational areas in the Ocoee Ranger District would not require independent potable water systems. Campsites provided by commercial purveyors would also be served by the Ocoee Utility District or other purveyor, depending on its location. Any potential development occurring along the upper Ocoee River would require an independent system or an extension of the infrastructure owned and operated by the utility District. It is not anticipated that any of the water supply systems would be significantly affected under Alternatives 1, 2, or 3.

Wastewater Collection and Treatment

The Ocoee Utility District currently does not operate a wastewater treatment facility. Plans are being made to construct a system to be used as a regional treatment facility. No target date for the completion of this facility has been set (Southeast Tennessee Development District, 1993). Therefore, no facilities would be available to serve this site.

There will be a wastewater treatment system in place at the administration building serving the immediate users of the facility. Wastewater generated at spectator facilities would be collected on-site and taken offsite for periodic disposal in 5,000 gallon loads. It is not anticipated that any of the area wastewater systems would be significantly affected under Alternatives 1, 2, and 3 or the no-action alternative; however, a local treatment facility with adequate surplus capacity would be selected as the disposal site. Adequate capacity would be available upon completion of the regional facility to be maintained by the Ocoee Utility District.

Any offsite commercial development adjacent to the proposed venue would likely be located within the service area of the Ocoee Utility District. However, independent septic systems would be required for any new commercial development in the vicinity until such time as a regional wastewater treatment facility operated by the District could serve the development along the Ocoee River.

Solid Waste Collection and Disposal

Solid waste generated at the site would be collected by private contract hauler and transported to one of the local landfills. The closest landfill within the ROI is located 20 miles away in Fannin County. An additional landfill is in McMinn County. It is not anticipated that any of the waste collection and

disposal systems would be significantly affected under Alternatives 1, 2, or 3.

Electricity and Telecommunications

According to the Design Report (USDA, 1993), Tri-State Electrical Cooperative would extend service from their current termination point on U.S. Highway 64 at the Brush Creek Bridge, 3.25 miles east to the Olympic Venue site by an overhead pole line. The overhead pole line would traverse the U.S. Highway 64 right-of-way for 5,000 feet to the Boyd Gap overlook and then 12,000 feet along the existing TVA transmission line to the Olympic Venue site. On-site distribution of electrical power would be above ground.

All communications to the site would be supplied by Bell South. The site would be connected to the buried cable at the intersection of U.S. Highway 64 and Tennessee Highway 68, approximately 6.5 miles from the site. The offsite distribution system would terminate in an electrical/communications facility for both site electrical and communication services. Communications would be distributed to facilities as required.

New commercial development occurring offsite would be served by Volunteer Electric. The substation at Ducktown would have adequate capacity to serve the energy requirements of any new development.

C.6.a.2 Cumulative Effects

No cumulative effects on public facilities would result from implementation of Alternatives 1, 2, or 3.

C.6.a.3 Mitigation Measures

Wastewater from the restrooms remaining at the site would require periodic collection as needed. Wastewater would be transported to local wastewater treatment facilities for treatment and disposal.

Electric service to the Olympic Venue site would be brought in along the existing TVA electrical power corridor (USDA, 1993). Use of existing routing would avoid the need to establish a new corridor and would avoid effects associated with corridor construction. On-site distribution of electrical power would be above ground to avoid excavation of acidic drainage associated with pyritic formations.

Communication cables are proposed to be buried along the U.S. Highway 64 corridor, thereby avoiding previously undisturbed resources. Proper erosion and sedimentation control measures would

be required to avoid exposure and discharge drainage from areas possibly containing pyritic material. These measures are discussed in Section C.9.

Conductors for both electrical power and communication services would be located above ground, protected by steel conduit, encased in concrete, and anchored. These measures would be taken to avoid potential excavation on-site that could cause pyritic material to leach and would also prevent potential washout from extraordinary flood events.

C.6.b Alternative 1

The majority of effects associated with Alternative 1 are common to Alternatives 1, 2, and 3, previously reported. Wastewater issues are discussed below.

C.6.b.1 Direct and Indirect Effects

Potable Water Supply

Upon the completion of the event, all movable structures such as the water storage facility would be removed. All other piping would be abandoned. Effects associated with well installation are considered temporary and not significant.

Wastewater

Sanitary trailers would be provided in the athlete support area as well as in the officials area. Each unit would be equipped with a 1,000-gallon storage tank. An adequately sized holding tank would be constructed, with each of the units connected to a pumped collector system which would discharge into the holding tank. The wastewater handling system would be designed to meet or exceed TDEC criteria. The holding tank would be pumped out as needed into transfer trucks and transported to local wastewater treatment facilities. Because most local treatment facilities cannot treat more than 5,000-gallons of wastewater at one time, several local treatment facilities may be used. Upon the completion of the event, the collector system would be removed, and the piping and tank would be abandoned in place in accordance with State and local requirements.

C.6.b.2 Cumulative Effects

Alternative 1 would result in no cumulative effects on public facilities.

C.6.b.3 Mitigation Measures

Mitigation measures are common for Alternatives 1, 2, and 3, and are discussed in Section C.6.a.3.

C.6.c Alternative 2 and Alternative 3 - Proposed Action

Effects on public facilities associated with Alternatives 2 and 3 are similar and are discussed in Section C.6.a with the exception of wastewater.

C.6.c.1 Direct and Indirect Effects

Wastewater

Under these alternatives, wastewater from permanently constructed public restrooms and other sources would be collected in a pumped collector system which would discharge into a holding tank. All wastewater would be transported to a local wastewater treatment facility via truck. This is the same as under the Alternative 1. At the close of the event, the wastewater treatment facility would continue to serve the permanent facilities. A flow-splitting device would route low flows to a septic facility to be located at the site. Periods of higher flow would be sent to the 20,000-gallon storage tank for removal and offsite disposal.

C.6.c.2 Cumulative Effects

Cumulative effects would result if restroom facilities remain in use on-site.

C.6.c.3 Mitigation Measures

Mitigation measures are common for Alternatives 1, 2, and 3, and are discussed in Section C.6.a.3.

C.6.d Alternative 4 - No Action

Direct and indirect effects of the no-action alternative on public facilities would mirror baseline conditions. Cumulative effects associated with the no-action alternative are not expected, and mitigation measures would therefore not be required.

C.7 Recreation

The analysis of direct and indirect effects on recreational opportunities in the Ocoee Ranger District resulting from the Olympic events include construction-period effects and actual Olympic event activity effects for the period 1994 to 1996. Effects associated with each alternative were identified based on additional or lost recreation opportunity, estimating long-term changes in facility demand and evaluating changes to the recreation experience. In conjunction with the development of the Olympic Venue facilities under Alternatives 2 and 3, the Forest Service would reclassify the project site and surrounding area from MA 5 to MA 1.

The recreation resources assessment matrix, Table IV.C.7-1, identifies changes in the recreation opportunities and experiences resulting from each of the alternatives. Changes are included for both tem

TABLE IV.C.7-1
Recreation Resource Assessment Matrix

Evaluation Criteria	Unit	Alternative 1	Alternative 2	Alternative 3	No Action
Recreation Opportunity ^a	Temporary	-3 ^c +2 ^d	-3 ^c +5 ^e	-3 ^c +9 ^f	0
	Long Term				0
Recreation Experience Effect ^b	Temporary ^g	17/56 0/28 ^h	17/56 3/28 ⁱ	17/56 3/28 ⁱ	0/56 0/28 ^h
	Long Term				

^a Shown as the number of additional or lost recreation facilities or activities caused by the action.

^b Shown as the number of negative effect changes to conditions of the ROS site indicators caused by the action effect/the total number of existing site indicators inventoried on Tables IV.C.7-2 to IV.C.7-5.

^c Temporary lost recreation facilities or activities include swimming, hiking and picnicking.

^d Improvements to parking and Old Copper Road hiking access.

^e Improvements to parking and Old Copper Road hiking access, day use building, trails and walkways, and the upper bridge.

^f Improvements to parking and Old Copper Road hiking access, day use building, trails and walkways, upper bridge, lower bridge, terraces, picnic areas and restroom.

^g Temporary Recreation Experience Effects include those during construction and during the Olympic Event (Tables IV.C.7-2 and IV.C.7-3).

^h Long Term Recreation Experience Effects taken from Table IV.C.7-4.

ⁱ Long Term Recreation Experience Effects taken from Table IV.C.7-5.

porary (those occurring during construction of venue facilities and the Olympic event period), and long-term (post event conditions). Recreation opportunity changes are shown as the number of additional or lost recreation facilities that would be caused from the actions under each alternative. The effects on the quality of recreation experience is shown as the number of negative changes to the ROS site indicators or conditions caused by the action, out of the total number of site indicators that could be changed.

Additional or lost recreation opportunities are identified based on analysis of existing facilities and the Design Report (USDA, 1993) for the Olympic event. The construction period and Olympic event activity effects identified are primarily temporary in duration, but would have direct effects on recreational opportunities and experience during these periods.

Effects on the recreational experience are qualitative effects that were evaluated by identifying site condition changes using the Recreation Opportunity Spectrum (McConnell, and Bacon, USDA, 1986). Five locations were evaluated in this analysis, including:

- Project Site
- Upper Ocoee River Corridor
- U.S. Highway 64 Corridor
- Little Frog Wilderness.
- Big Frog Wilderness

Tables IV.C.7-2 through IV.C.7-5 identify each of these areas, the corresponding ROS classification, and existing condition factor for each of the seven ROS setting indicators, including:

- Access
- Remoteness
- Naturalness
- Site Facilities and Management
- Social Encounters
- Visitor Effects
- Visitor Management

Changes in the existing condition factor resulting from effects associated with the proposed Olympic event activities identify indirect effects on the recreational resources and opportunities of each area. A change in condition from fully compatible

toward an unacceptable condition would be defined as a negative effect.

Effects associated with the Olympic event, under any of the alternatives would primarily affect recreation facilities and opportunities within the Ocoee Ranger District. Effects on public and private recreation in the ROI would be minor and dependent upon development of other tourism support facilities.

The Big Frog Wilderness is located at a distance of over 1 mile from the Olympic site across heavily wooded and steep topography. The project site is not visible from this wilderness. Noise effects even during construction and the event are not projected to affect the Big Frog Wilderness. Therefore this wilderness was not specifically included in the recreation analysis, and eliminated from the assessment tables.

C.7.a Effects Common To Alternatives 1, 2, and 3

Effects common to Alternatives 1, 2, and 3 include temporary effects relating to venue facilities construction, and those associated with operating the events. These are discussed below.

C.7.a.1 Direct and Indirect Effects

Direct effects common to Alternatives 1, 2, and 3 would include temporary effects resulting from the construction of facilities and those from actually holding the Olympic event. Loss of use of certain facilities would be anticipated, along with some degradation in the recreational experience during these periods (approximately 2 years). Specific recreational opportunities that would be lost during this period include:

- Use of the "Blue Hole" area for day use swimming and picnicking, primarily by local residents, because during this period access to the site will probably be restricted at times for safety and/or security reasons.
- Hiking opportunities in the project site area, including access to Old Copper Road.
- Sightseeing (considered a passive form of recreation) "panoramic" view of Ocoee River from U.S. Highway 64 would be affected by views of the construction activities, and later, the event facilities in the project site area. The panoramic view would be modified, but not eliminated.

Specific changes in the recreational experiences in the four areas identified are summarized in Table IV.C.7-2 for effects during construction, and Table IV.C.7-3, for effects during Olympic event.

TABLE IV.C.7-2
Recreation Opportunity Spectrum Analysis of Temporary Effects During Construction (Alternatives 1, 2, and 3)

Area	ROS Management Direction	Access	Remoteness	Naturalness	Site Facilities	Social Encounters	Visitor Effects	Visitor Management
Project Site	Rural	<i>FC</i>	<i>N</i>	<i>N-INC</i>	<i>N-INC</i>	<i>N-INC</i>	<i>N-INC</i>	<i>N-INC</i>
Upper River Corridor	Roaded Natural	<i>N</i>	<i>N</i>	<i>FC</i>	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>
U.S. 64 Corridor	Roaded Natural/Rural	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>	<i>N-INC</i>
Little Frog Wilderness	Primitive/Semi-Primitive	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>

Legend:

FC Fully compatible conditions that meet or exceeded the norm.

N Normal conditions found in the setting.

INC Inconsistent conditions not generally compatible, but may be necessary.

UA Unacceptable conditions.

Note: Italicized abbreviations represent existing conditions (total inventoried = 28).

Bolded and underlined abbreviations represent changed condition due to effects of Olympic event (total negative changes on this Table = 6).

TABLE IV.C.7-3
Recreation Opportunity Spectrum Analysis of Temporary Effects During Olympic Event (Alternatives 1, 2, and 3)

Area	ROS Management Direction	Access	Remoteness	Naturalness	Site Facilities	Social Encounters	Visitor Effects	Visitor Management
Project Site	Rural	N	N	<u>N-INC</u>	<u>N-INC</u>	<u>N-INC</u>	<u>N-INC</u>	<u>N-INC</u>
Upper River Corridor	Roaded Natural	<u>N-INC</u>	N	FC	N	N	N	N
U.S. 64 Corridor	Roaded Natural/Rural	N	N	<u>N-INC</u>	<u>N-UA</u>	<u>N-UA</u>	<u>N-INC</u>	<u>N-UA</u>
Little Frog Wilderness	Primitive/Semi-Primitive	N	N	N	N	N	N	N

Legend:

FC Fully compatible conditions that meet or exceeded the norm.

N Normal conditions found in the setting.

INC Inconsistent conditions not generally compatible, but may be necessary.

UA Unacceptable conditions.

Note: Italicized abbreviations represent existing conditions (total inventoried = 28).

Bolded and underlined abbreviations represent changed condition due to effects of Olympic event (total negative changes on this table = 11).

TABLE IV.C.7-4
Recreation Opportunity Spectrum Analysis of Post-Olympic Event Effects of Alternatives 1 and 4

Area	ROS Management Direction	Access	Remoteness	Naturalness	Site Facilities	Social Encounters	Visitor Effects	Visitor Management
Project Site	Rural	FC	N	N	N	N	N	N
Upper River Corridor	Roaded Natural	N	N	FC	N	N	N	N
U.S. 64 Corridor	Roaded Natural/Rural	N	N	N	N	N	N	N
Little Frog Wilderness	Primitive/Semi-Primitive	N	N	N	N	N	N	N

Legend:

- FC Fully compatible conditions that meet or exceeded the norm.
- N Normal conditions found in the setting.
- INC Inconsistent conditions not generally compatible, but may be necessary.
- UA Unacceptable conditions
- Notes: Italicized abbreviations represent existing conditions (total inventoried = 28).
No changes identified under these alternatives.

TABLE IV.C.7-5
Recreation Opportunity Spectrum Analysis of Post-Olympic Event Effects of Alternatives 2 & 3

Area	ROS Management Direction	Access	Remoteness	Naturalness	Site Facilities	Social Encounters	Visitor Effects	Visitor Management
Project Site	Rural	FC	N	N	N	N-INC	N	N
Upper River Corridor	Roaded Natural	N	N	FC	N	N-INC	N	N
U.S. 64 Corridor	Roaded Natural/Rural	N	N	N	N	N	N	N
Little Frog Wilderness	Primitive/Semi-Primitive	N	N	N	N	N	N	N

Legend:

FC Fully compatible conditions that meet or exceeded the norm.

N Normal conditions found in the setting.

INC Inconsistent conditions not generally compatible, but may be necessary.

UA Unacceptable conditions.

Note: Italicized abbreviations represent existing conditions (total inventoried = 28).

Bolded and underlined abbreviations represent changed condition due to effects of Olympic event (total negative changes on this table = 2).

As shown on Table IV.C.7-2, five out of six temporary negative effects on the setting indicators during construction would occur at the project site, but would also affect the movement of visitors along the U.S. Highway 64 corridor. While all changes would be negative, these effects would be temporary and should be expected because the site would be closed and lost for recreational experience opportunities.

Review of Table IV.C.7-3 reveals a loss during the Olympic event for the types of outdoor recreational experiences associated with the baseline condition on-site. While this lost recreation opportunity would be a negative effect, there would be some positive effects such as easier access, more control over a high-use site, availability of sanitation facilities, increased law enforcement, and cleanup of trash/debris. The negative effects on recreational opportunities would be temporary under each alternative. This analysis does not account for the more passive "spectator" recreational opportunity of watching the whitewater events during this period. Negative effects would also be experienced along the U.S. Highway 64 corridor because of the anticipated large crowds attending the event.

The area adjacent to U.S. Highway 64 in the Little Frog Wilderness would experience some additional noise during the construction and event periods. However the existing topography and vegetation in this area would buffer this noise from the majority of the wilderness. (See also Section C.3 noise).

C.7.a.2 Cumulative Effects

No cumulative effects would result from the effects common to Alternatives 1, 2, and 3.

C.7.a.3 Mitigation Measures

Limited opportunities to mitigate the direct effects identified as common to Alternatives 1, 2, and 3 could include:

- Providing aesthetically pleasing screening (vegetative or natural materials) of any unsightly construction areas along U.S. Highway 64, which is a National Forest Scenic Byway providing varied forms of recreation opportunities.
- Constructing the 25-car parking lot early and providing an overlook from this general area for viewing the Olympic site under construction.

C.7.b Alternative 1

Effects associated with implementation of Alternative 1 are summarized in Table IV.C.7-1. The table identifies three recreation facilities/activities lost during construction and the events

(hiking, swimming and picnicking), and two facilities added after the event (parking and improved access to hiking Old Copper Road.

C.7.b.1 Direct and Indirect Effects

Other than those temporary effects identified under Section C.7.a, there is one feature that would have a direct effect on recreation opportunities. This feature is the small parking area. It would be available for supporting several existing forms of recreation activity that occur in the project site area. This includes the day use and picnicking activities associated with swimming in the "Blue Hole" area. This parking could also be used by those accessing Old Copper Road or by paddlers using the Ocoee River during occasional water-release periods.

Removing all facilities constructed for the Olympic event and ceasing water release into the upper section of the Ocoee River would almost eliminate all indirect effects on recreation. However even with the removal of event-related facilities, as is the case in Alternative 1, the popularity gained from hosting the Olympic event would increase interest in whitewater recreation on the Ocoee River. The lower stretch of the river currently open for whitewater activities has experienced continual growth in recreational activity over the last several years, and this additional interest would likely accelerate the growth rate. Facilities supporting whitewater activities such as camping would also likely to experience an accelerated increase in demand.

C.7.b.2 Cumulative Effects

The cumulative effects of Alternative 1 on the recreation opportunities have been summarized for each of the four areas identified in the ROS analysis on Table III.C.7-4. All recreation day use activities at the site, including swimming in the "Blue Hole," picnicking, and hiking along Old Copper Road, would return to their original condition. Improved parking facilities that support these recreation activities would remain after the event and would be in the same location as the existing parking area. The current upper river corridor recreational opportunities of hiking Old Copper Road, swimming in holes along the river, picnicking, and limited other day use activities can be resumed in this area upon removal of temporary facilities and site rehabilitation after the Olympic event. Conditions would be equal to the pre-event situations.

The area campgrounds would not be affected after the event, because without additional water releases, there would not be an increase in whitewater recreation in the upper Ocoee River resulting from the Olympic event.

Both the Big and Little Frog Wildernesses are removed geographically and screened with vegetation sufficiently from the Olympic Venue site that there would be no cumulative effects on these areas.

C.7.b.3 Mitigation Measures

Mitigation measures would be the same as those common to Alternatives 1, 2, and 3.

C.7.c Alternative 2

Alternative 2 would retain some of the facilities during the post-Olympics period. Table IV.C.7-1 identifies three recreation facilities/activities lost during construction and the events (hiking, swimming and picnicking), and five facilities added after the event (parking, improved access to hiking Old Copper Road, day use building, upper bridge, and additional trails).

C.7.c.1 Direct and Indirect Effects

Direct effects on recreation resulting from Alternative 2 would include additional facilities in comparison to Alternative 1 as well as losses or negative effects on other recreational opportunities. The temporary effects of construction and operation of the Olympic event are identified under effects common to Alternatives 1, 2, and 3. In addition, the following are specific effects associated with this alternative.

Alternative 2 would have an adverse effect on recreation use of the "Blue Hole" for swimming purposes during the period 1994 to 1996, and possibly during reconditioning.

The proposed parking area included in this alternative would provide parking for new recreational opportunities and the resumption of the current day use recreation activities of swimming in "Blue Hole," picnicking, and hiking along Old Copper Road.

Under this alternative the proposed day use building would be available for several different types of recreational activities, such as an information center, interpretive center, rest and refreshment facility for river users, or a national whitewater training center (specifics still to be determined). There are currently no facilities or other opportunities planned to provide such recreational experiences in this area.

The upper bridge remaining as a permanent structure after the Olympic event would provide a crossing to the left bank of the river, thereby providing improved access for potential hiking trails in the CNF.

The site improvements would also provide better access to the Old Copper Road. The design and

construction of these proposed access improvements would be completed without affecting remaining segments of this cultural resource.

ROS conditions under the "Social Encounters" category would change in two locations; the proposed venue site and the upper river corridor (Table IV.C.7-5). These changes are not categorized as unacceptable conditions. Therefore, the effects on the recreational experience would be minimal.

C.7.c.2 Cumulative Effects

Cumulative effects of Alternative 2 include short-term loss of recreational facilities use, and diminished quality of the recreation experience during the construction period and Olympic event. However, additional recreational opportunities would increase over the long-term, with minimal loss to the overall quality of the recreation experience.

C.7.c.3 Mitigation Measures

Measures to mitigate the effects of this alternative include those listed under effects common to Alternatives 1, 2, and 3. In addition, careful planning, design, implementation, and management of the area would maximize recreation opportunities of the Ocoee River without loss of site characteristics which promote the recreational experience. Many of the planning and design methods are identified in the Design Report (USDA, 1993).

C.7.d Alternative 3 - Proposed Action

This alternative is very similar to Alternative 2 in that more of the venue facilities would be permanent. Table IV.C.7-1 identifies three recreation facilities/activities lost during construction and the events (hiking, swimming and picnicking), and nine facilities added after the event (parking, improved access to hiking Old Copper Road, terraced seating areas, day use building, upper bridge, lower bridge, additional trails, picnic areas, and restroom facilities).

C.7.d.1 Direct and Indirect Effects

Direct effects on recreation resulting from Alternative 3 would include the addition of facilities as well as losses or negative effects on other recreational opportunities. The temporary effects of construction and the Olympic event are identified under effects common to Alternatives 1, 2, and 3 (Tables IV.C.7-2 and IV.C.7-3). Most of the direct effects would be identical to those identified for Alternative 2, and the specifics of each are only referenced here. In addition, the lower bridge across the Ocoee River would be a permanent structure after the Olympic event under Alternative 3. This bridge would provide additional access to the left bank of the river

and to additional trails and hiking areas. The terrace area to be constructed between the river and the highway would provide viewing areas of the river and picnic areas, while enhancing the Scenic Byway. The indirect effects on recreation for Alternative 3 would be the same as those listed for Alternative 2.

C.7.d.2 Cumulative Effects

The cumulative effects on recreation of Alternative 3 would be the same as for those described Alternative 2, with the added enhanced access provided by the additional lower pedestrian bridge.

C.7.d.3 Mitigation Measures

The mitigation measures described for Alternative 3 would be the same as provided for Alternative 2.

C.7.e Alternative 4 - No Action

Under the no-action alternative, the Olympic Venue would not be constructed. Therefore, there would be no direct, indirect, or cumulative effects. No mitigation measures would be necessary.

C.8 Visual Resources

The effects on visual resources generated by the proposed Olympic Venue alternatives were analyzed using procedures from the Forest Service Visual Management System (VMS) (USDA, 1986b). This analysis reviews the effects of each alternative on the visual resources described in Chapter III. An assessment matrix for visual resources is provided in Table IV.C.8-1.

A 2-year timeframe was used to compare current visual resources to projected consequences. This 2-year period covers reconditioning of the site. Visual resources were analyzed from three viewer locations: U.S. Highway 64, the Ocoee River, and Little Frog Wilderness.

Direct and indirect visual effects have been identified for each of Alternatives 1, 2, and 3. Direct effects are related to site development (the venue parking lot, potable water, telecommunication, and day use building, related facilities), while indirect effects consider surrounding communities (induced development) and activity levels (tourism). The majority of effects resulting from the Olympic facilities and activities are classified as direct effects on the visual resources of the site and have been grouped into five categories:

- Landform Modifications
- Tree Clearing/Landscape Plantings
- Building & Structures

- Site Development
- Utilities

Indirect visual effects are primarily associated with effects of potential support facilities in surrounding communities or long-term changes in the level of activity on the site.

C.8.a Effects Common To Alternatives 1, 2, and 3

Each of Alternatives 1, 2, and 3 has features in common. Development of these alternatives will therefore result in similar visual effects resulting from these features. The common effects are discussed below.

C.8.a.1 Direct and Indirect Effects

The proposed temporary 25-car parking area along U.S. Highway 64 is located over an existing gravel lot used for pull-off parking and construction staging by the TDOT. Currently, this area is quite visible and unsightly from the highway. Very little additional space would be affected by the construction of this parking lot. Therefore, this lot would not negatively affect the visual resources of the site. Through good site planning and design, the parking lot construction could enhance views by screening and buffering this facility from U.S. Highway 64.

Water service for Alternatives 1, 2, and 3 would be the same. The well proposed at Williams Creek, the small water treatment facility, and the water service line would have little or no effect on the visual resources of the site if designed and constructed in accordance with good site planning principles.

Telecommunication cables would be buried within the cleared U.S. Highway 64 corridor, and thus would not have a negative effect on the post-event visual resources of the area. Electric service to the site would be provided from the existing TVA corridor. Any permanent electric services along the U.S. Highway 64 corridor, or within the project site would be installed underground. Lines in other areas would follow FS guidelines to minimize visual effects.

Remote parking for the Olympic event would be provided in the communities of Cleveland and Ducktown, Tennessee. Until specific locations and types of parking have been determined, the visual effect of these facilities cannot be reviewed. However, because parking facilities could have negative visual effects, there is reason to identify this as a potential effect on the visual resources of these communities.

An increase in the activity along the Ocoee River after the event could have a negative visual

TABLE IV.C.8.1
Visual Resource Assessment Matrix

Evaluation Criteria	Unit of Measurement	Alternatives			
		1	2	3	4
Viewsheds Affected U.S. Hwy 64 Corridor	Number	0	1 - View of Upper Bridge	1 - View of Upper Bridge	No Effect
Ocoee River Corridor	Number	1 - View of Channel Modifications	1 - View of Channel Modifications	1 - View of Channel Modifications	0
Little Frog Wilderness	Number	0	0	0	0
Total Viewsheds Attached		1	2	2	0
Scenic Resources Affected	Number	0	1 - Tree Clearing	1 - Tree Clearing	No Effect
Architectural Forms Affecting Site	Number	0	2 - Day Use Building and Upper Bridge	3 - Day Use Building, Upper Bridge, and Lower Pedestrian Bridge	No Effect

effect on the area from additional litter and general wear and tear.

With the removal of event-related facilities under Alternative 1, the notoriety gained from hosting the Olympic event would increase interest in white-water recreation on the Ocoee River. Typically, this interest would promote tourism and related development such as motels, campgrounds, outfitter stores, restaurants, souvenir shops, and entertainment establishments as well as their related outdoor advertising. Without implementation of planning and design controls by local government, these facilities could have a negative effect on the visual resources of the community.

C.8.a.2 Cumulative Effects

No cumulative effects would result from Alternatives 1, 2, or 3.

C.8.a.3 Mitigation Measures

The following mitigation measures are proposed to address effects on the visual resources that are common to all action Alternatives 1, 2, and 3.

Site development should be designed to blend with the existing topography to minimize site grading. Natural materials such as boulders indigenous to the area for slope protection and/or wooden guard rails should be used in lieu of typical highway construction methods. Alternative paving materials would be considered instead of standard asphalt or concrete. This may include crushed stone or gravel, packed earth or soil, cement, or even grasses for low use areas. Signing and lighting should be minimized for post-event purposes. Where lighting is needed, wood poles should be used with standardized fixtures with rustic design characteristics. Lighting levels should be kept to the minimum needed for specific requirements. The number of permanent signs should be kept to the minimum necessary, be of a consistent design, and constructed of wood. The site would be restored to its original condition to the extent practicable, including revegetation.

Pathways should be constructed of materials that are indigenous to the site to the extent practicable.

Care would be taken to locate all utilities in the least visible areas possible. Underground telecommunication cables would be placed in the existing U.S. Highway 64 corridor, which would minimize visual effects.

C.8.b Alternative 1

The following items have been identified on effects to the visual resources of the site 2 years after the Alternative 1 facilities have been removed.

C.8.b.1 Direct and Indirect Effects

Alternative 1, which would return the site to near baseline conditions, has no major landform modifications other than the temporary narrowing of the river. This modification would have a negative effect on visual resources.

Very little tree clearing would be required to construct this alternative. Left bank tree clearing would be limited to removal along the existing treeline and river edge where the rock fill road would be constructed. Tree clearing on the right bank would include some limited clearing around the 25-car parking lot and the area between the highway and river about 750 feet west of the parking lot. Landscape plantings proposed to remain after the event are not identified in the Design Report (USDA, 1993), except around the parking lot. Because there is only limited clearing required under this alternative, vegetative regrowth after rehabilitation will return the site to conditions having a visual resource character resembling existing conditions.

Views of the venue site from Little Frog Wilderness is distant, and direct views of the project site are somewhat buffered and/or visually screened from direct view by the existing trees and vegetation of the site. These conditions, together with the temporary aspect of this alternative, indicate there would be limited visual effect on these wildernesses. Alternative 1 will not have a cumulative effect on the visual resources of the project site. Alternative 1 can be developed within the constraints of the retention VQO for the site and wildernesses, because within 2 years of the event, the development would not appear evident to the casual observer.

No building or structures from the Olympic Venue would remain on the site under this alternative. However, it is anticipated that it would not be feasible to remove all remnants of the anchoring devices and materials which would be required for the temporary buildings, bridges, course, bleachers and other temporary structures. Other than those anchoring devices, the temporary buildings and structures would not have a negative visual effect after their removal from the site. Removal of the competitive channel could result in scarring of the stream bed.

Under this alternative, wastewater would be piped to a temporary storage tank and then hauled off-site for treatment. These facilities would be removed after the event and would not have a negative effect on the visual resources of the site.

As the existing TVA corridor would be used to service the electric needs of the site, and lines and poles to support electrical cables would be removed

after the event, there would be no effect on the post-event visual resources.

C.8.b.2 Cumulative Effects

No cumulative effects would result from Alternative 1.

C.8.b.3 Mitigation Measures

Trees removed during construction would be replaced, and should be planted in the area between the river and road as part of the post-event reconditioning operation. Other mitigation measures are presented in Section C.8.a.3.

C.8.c Alternative 2

The following items have been identified as effects on the visual resources of the site under the Alternative 2 scenario, 2 years after the event and removal of any temporary facilities.

C.8.c.1 Direct and Indirect Effects

Alternative 2 would leave one major landform modification at the site, that being narrowing of the Ocoee River. However, the narrowing as proposed would simulate the natural landform conditions and be covered with materials and boulders matching those on the site, thereby minimizing the visual effect.

The abutments for the upstream bridge on the right bank would be built into the existing topography to minimize the visual effect near Old Copper Road. The abutment on the left bank would require some modification to the existing landform to set the abutment at a suitable grade.

Left-bank tree clearing would include some site clearing in the temporary building area and along the existing river where the rock fill embankment would be placed out to the narrowed edge of the river. Right-bank tree clearing would include some limited clearing at the permanent building site and around the 25-car parking lot. Landscape plantings have been proposed along the highway, on the terraces and in other areas of the project site (USDA, 1993).

The clearing activities required for this alternative would cause a negative effect on the visual resources of the site if not completed with a design sensitivity typically incorporated into Forest Service recreation projects. If this tree clearing and replacement/supplemental plantings are in keeping with the design character guidelines identified, the tree clearing and plantings could be completed with few effects on the visual resources of the site and would not be visually evident.

Architectural structures identified to remain post-Olympic event would include the day use

building and upper bridge. All other structures would be removed. Because some of the temporary facilities could be used again, some of the anchoring devices might remain, but would not be visually prominent.

The two-story day use building, to be constructed with an exterior of natural materials (wood and stone), would be set into the site and screened by existing trees from most viewers. The visual effect of the upper bridge would be most apparent from the river and the Old Copper Road. However, the design and materials would be selected to minimize their effect and relate to the natural and cultural character of the surrounding community.

The terraces proposed between the new edge of the river and the highway would provide positive effects on viewing areas of the river and would create a natural (visually appealing) appearance. Originally, the highway was constructed through this narrow area between the river and mountain, requiring the placement of limestone rock as fill on steep slopes. The limestone appears unnatural because of its contrasting form. The proposed terraces would extend out into part of the current riverbed, creating a more irregular natural landform with cover materials matching those indigenous to the site.

The views from U.S. Highway 64 that would change are of the river, the terraced area, and the day use building. The channeling on the left bank would be visible but not highly evident. The terraced area would fall away from the road, and the building would be screened by existing and new plantings, thereby limiting views of these features.

The three structures or elements that would be visible from the Ocoee River corridor are the narrowing of the river channel and the two permanent structures to remain (day use building and upper bridge). Having these elements in this viewshed would have minimal effect on the visual resources along the corridor. Because the only potential view of the site from the Little Frog Wilderness is limited to a small area, which is a long distance (about 0.5 mile) and is partially screened for most of the year, views of the site and any structures would not have an effect on visual resources.

Visual effects of the wastewater collection system would be minimized by design and use of vegetation screening.

C.8.c.2 Cumulative Effects

No cumulative effects would result from Alternative 2.

C.8.c.3 Mitigation Measures

In addition to the mitigation measures presented for Alternative 1, the following measures are proposed to mitigate effects of Alternative 2.

All grading and alterations of the existing landforms would be designed to appear natural in appearance by using forms found already on the project site. The existing fill material along the highway would be covered with rock that appears indigenous to the site, incorporating features such as shapes of similar color, size, and texture. Terracing slopes along the river would provide functional areas for pedestrian use and incorporate indigenous rockforms. Uniform slopes with benched areas for seating should be avoided. Rocks and boulders should be incorporated to resemble outcroppings and provide slope stabilization.

Narrowing of the river channel and the left bank bridge abutment are the major landform modifications that would require mitigation. The Design Report (USDA, 1993) identifies the treatment of these features with natural materials. Designing the river course in natural forms and the use of indigenous materials such as river stone for facing the river bank would visually mitigate the impact of narrowing the river. Natural occurring materials and colors can help to mitigate the visual impact of the bridge abutment, but it would not be visually dominant.

Clearing of trees and other vegetation would not be completed in straight lines or vertical planes, but would follow irregular lines similar to those found naturally along the river. Replanting of cleared and graded areas would be required to speed recovery of the area to a more natural appearance. Plantings would not be of a single variety or arranged in formal design patterns. Spacing between plants would be irregular. Plantings would be massed informally in groups with a mixed of indigenous trees, including deciduous and evergreen, as well as overstory and understory. Care would be taken to evaluate the different micro-climatic conditions at various locations, such as moisture near the riverbed and higher heat conditions closer to the highway pavement. Plants would be carefully selected to meet these specific conditions. Material would be sized to maximize survivability and yet have maximum early visual effect.

Permanent buildings and structures remaining after the Olympic events would be rustic in appearance, utilizing primarily timber and stone for exterior finishes. The height of the buildings would not exceed two stories, with no more than one-half of the vertical distance of the roofline penetrating the top of the treeline. Bridges across the river would

have abutments built and/or faced with stone and other structural members and wood decking to replicate typical bridges found in the region.

C.8.d Alternative 3 - Proposed Action

The following have been identified as effects on the visual resources of the site under Alternative 3, 2 years after the event.

C.8.d.1 Direct and Indirect Effects

The Alternative 3 scenario would leave one major landform modification to the site, that being narrowing of the Ocoee River to accommodate the competitive channel. However, the narrowing as proposed would simulate the natural landform conditions and be covered with materials and boulders matching those on the site.

The abutments on the right bank for both the upstream and downstream bridges would be built into the existing topography to minimize their visual effect. The abutments on the left bank would require some modification to the existing landform. The Design Report (USDA, 1993) identifies the treatment of these features with natural materials such that these modifications would not be visually evident to the casual observer.

The clearing required for this alternative would cause a negative effect on the visual resources of the site if not completed with a design sensitivity typically incorporated into Forest Service recreation projects. If this tree clearing and replacement/supplement plantings are in keeping with the design character guidelines identified, this aspect of the alternative could be completed without negatively affecting the visual resources of the site.

The two-story, approximately 16,740-square-foot building constructed with an exterior of natural materials such as wood and stone would be set into the site and partially screened by existing trees from most viewers. The visual effect of the upper bridge would be most apparent from the river and from the Old Copper Road. The lower footbridge would be visible from the highway. However, the design and materials have been selected to minimize their effect and relate to the natural and cultural character of the surrounding community.

The terraces proposed between the new right-bank river edge and the highway would provide a positive effect on viewing areas of the river and could create a more natural appearance than the no-action alternative. Originally, when the highway was constructed through this narrow area between the river and mountain, the placement of limestone rock and fill on steep slopes was required. This fill appears unnatural because of its form and materials. The proposed terraces would extend into part of the

current riverbed, creating a more irregular natural landform with materials matching those indigenous to the site.

The visual effect of the wastewater collection system features would be minimized if constructed in accordance with the design recommendations identified under mitigation measures (Section C.8.a.3, C.8.b.3, and C.8.c.3). Because the only potential view of the site from Little Frog Wilderness is limited to a small area which is a long distance (about 0.5 mile) and is partially screened for most of the year, views at the site and any structure will not have an effect on the visual resources.

C.8.d.2 Cumulative Effects

No cumulative effects would result from Alternative 3.

C.8.d.3 Mitigation Measures

Mitigation measures would be the same as those summarized for Alternative 2 (Section C.8.c.3).

C.8.e Alternative 4 - No Action

The Olympic event proposed on the Ocoee River would not be held under the no-action alternative.

C.8.e.1 Direct and Indirect Effects

Generally, direct effects on the visual resources of the project site are not anticipated for the no-action alternative. However, the no-action alternative would continue the management practice of not releasing water (for whitewater recreation). Therefore this alternative would not provide water flow in the Ocoee River which is a very important element of the waterform scenic resource.

Several existing site features have a negative visual impression, such as the parking area, limestone rock embankment along the highway, trash/debris and rock graffiti associated with the day use picnicking and swimming. Under the no-action alternative, these features would most likely remain in the same condition or worsen with time.

C.8.e.2 Cumulative Effects

Cumulative effects associated with the existing conditions under the no-action alternative are expected to consist of continued pressure for whitewater recreation use of the river, and lack of visual improvements. The Ocoee River Scenic Byway: Guidelines for Management and Interpretation details improvements to be made in the corridor. Details concerning the plan are not available at this time.

C.8.e.3 Mitigation Measures

No mitigation measures would be required for this alternative.

C.9 Geology and Soils

This section describes the potential effects of the alternatives on the local geology and soils of the area. Geology and soils would be affected largely during the construction phase, when local surface features would be altered. An assessment matrix for geology and soils is presented as Table IV.C.9-1.

C.9.a Effects Common To Alternatives 1, 2, and 3

Effects to the geology and soils of the Olympic Venue site and adjacent lands are primarily related to construction activities and alteration of the physical features on-site. These effects are summarized in the assessment matrix on Table IV.C.9.1.

C.9.a.1 Direct and Indirect Effects

Alternatives 1, 2, and 3 would be constructed on soil and rock formations having a tendency to erode or become unstable when disturbed. The Cataska and the Tusquitee soil series have severe erosion potential and occur over 95 percent of the Olympic Venue site. Erosion and sedimentation effects on water quality are addressed in Section IV.C.10.

According to the Design Report (USDA, 1993) zones where slopes exceeded 30 percent would be preserved or used for passive recreation. Optimum development would occur on slopes of less than 15 percent. Therefore effects due to slope instability would not be significant.

There are no direct effects on mineral resources from the construction of the proposed Olympic Venue. It is assumed that all construction materials, except loose rocks collected from the riverbed, would be transported from offsite sources, and there would be no reduction of raw materials at the venue site. Use of limestone fill materials for construction of facilities would not be expected to reduce availability of these materials from local supplies, thus there would be no major effects from commitment of these resources. Indirect effects on mineral resources from the construction of the Olympic Venue would not be expected.

Geological effects include the changes in topography due to grading, alteration of the river bed and placement of bridge abutments, footings and anchors for bleachers. The major geological concern is the occurrence of pyritic rocks in the vicinity of the Venue site, and the effects construction would have on water quality due to acidic drainage. The water quality issue is addressed in Section IV.C.10.

TABLE IV.C.9.1
Geology and Soils
Resource Assessment Matrix

Evaluation Criteria	Units of Measurement	Alternatives			
		1	2	3	4
Clearing of Vegetation	acres	7.2	10.2	12.5	0
Grading of land surface	cubic yards	3,550	13,926	11,730	0
Earth Fill	cubic yards	4,050	9,124	8,474	0
Limestone Fill	tons	60,800	118,900	149,300	0
Boulders Collected from Riverbed	tons	12,000	12,400	12,400	0
Post-Olympic Material Mobilization	cubic yards	72,000	10,000	10,000	0

The indirect effects associated with the Olympic event include induced growth in the area associated with increased recreation and visitor use of the site. New construction has the potential to disturb pyritic rocks if present, and cause acidic drainage if proper precautions are not taken.

C.9.a.2 Cumulative Effects

Since the Ocoee River receives drainage from an historically disturbed watershed, the cumulative effects associated with the Olympic event are minimal relative to the soil erosion and mining activities in the past. While venue construction activities would also cause erosion, sedimentation control measures would effectively reduce the effect.

C.9.a.3 Mitigation Measures

Mitigation measures recommended focus on containing and reducing erosion and sedimentation through best construction management practices and installation of silt fences and other structural erosion and sedimentation controls. Proper slope stabilization construction techniques and use of best management practices would prevent adverse effects related to slope stability. Additional information concerning erosion and sedimentation control is provided in Section C.10, Hydrology. On-site slopes in excess of 30 percent would be avoided.

The formation of acidic leachate can be prevented by isolating pyritic material from oxygenated water. The following guidelines (Byerly, 1992) have been incorporated into road construction projects located within areas of similar rock types and are recommended for the reduction of effects along the Ocoee River.

- Excavation of acid producing rock would be avoided where possible and always minimized.
- Collection of rock samples from any areas of proposed excavation and analysis for their potential to produce acidic drainage.
- On-site inspection of all materials to be excavated would be provided by geotechnical personnel. A project geologist should oversee all related activities, including core drilling, earth moving, temporary storage, and eventual encapsulation. Adequate access to testing and analysis facilities should be available.
- Sites for disposal of all anticipated acid-producing material, and borrow sites from which cover material for burial of the acid-producing material would be identified and approved prior to disposal.
- Acidic rock would be treated with crushed limestone where necessary.

- Encapsulation of acid-producing material should follow acceptable design standards. Site-specific best management practices to address exposed acid-producing rock should be developed in detail during the design phase. The techniques for capping acid-producing rock should be applied in a riverine* environment.
- Complete avoidance of pyritic rocks is strongly recommended. Successful sealing or capping of exposed pyritic rock has been difficult to achieve elsewhere, and could be very difficult in the river environment at the proposed Olympic Venue.

There has been concern over the length of time limestone effectively reduces the acidic effects of pyritic materials. Several recent reports investigating the treatment of acid drainage problems indicate that addition of an organic layer to limestone in proximity to sulfide-bearing rocks extends the functional life of the limestone (Dvorak et al., 1988; Hedin et al., 1992; Rabenhorst et al., 1993). Hay, peat and other carbonaceous materials could be placed in a mat beneath geotextile material, and then overlaid with limestone. Placing significant amounts of straw in contact with the Anakeesta beneath limestone should maintain the sulfides in a reduced condition. However, the primary mitigation measure recommended is detection and avoidance of pyritic rock.

Construction contractors would use best management practices to minimize erosion and sedimentation. A construction site NPDES permit would be required to begin venue construction. Construction specifications to minimize erosion and sedimentation must include an erosion-control plan. The plan would be developed in cooperation with the Forest Service. The plan should be specific, and would include such techniques as diversion structures to prevent runoff from entering construction areas, seeding temporary ground covers and grassy slopes, grassed waterways, retention basins, silt fences, and similar measures to prevent and minimize erosion and sedimentation. Because potentially acid-producing rock locations are known, the layout of the competitive course and ancillary facilities would be located to minimize excavation in high risk areas.

C.9.b Alternative 1

Under this alternative no excavation of existing land surface would be required. Topography would be altered by grading areas for management offices, spectator services and Olympic facilities areas.

C.9.b.1 Direct and Indirect Effects

Removal of the competitive channel would result in significant changes to the natural riverbed. Due to the amount of fill anticipated, it would be virtually impossible to return the riverbed to exact pre-event conditions. The addition and later removal of large amounts of fill in the riverbed could cause breakage of the natural ledges and rocks which may lead to increased acid drainage, erosion of riverbanks, and the introduction of sediments into the river.

The potential increase in water acidity associated with exposure of sulfidic rocks during the construction of the Olympic Venue appears to be minimal in terms of the existing pH levels of the Ocoee River. The effects of acid drainage are addressed in Section IV.A.10, Water Quality.

Under Alternative 1, soils would be disturbed twice, during construction and during reconditioning. Removal of the competitive channel, upper and lower bridges, and day use facilities would result in increased construction traffic, which would likely cause increased erosion and sedimentation. The amount of material mobilized during reconditioning exceeds Alternatives 2 and 3 by 62,000 cubic yards (Table IV.C.9.1). While less fill would be required, the potential for erosion would be greater in Alternative 1 due to extensive reconditioning efforts required.

C.9.b.2 Cumulative Effects

Cumulative effects associated with the disturbance of the geology and soils in the area proposed for Olympic development and areas draining to the Ocoee River would be those common to alternatives 1, 2, and 3 (see Section C.9.a.2).

C.9.b.3 Mitigation Measures

Methods recommended for mitigating potential effects associated with disturbing the geology and soils in the area of the proposed Olympic Venue would be those common to Alternatives 1, 2, and 3, as described in Section C.9.a.3. Additional precautionary measures would be required to avoid disturbing pyritic rocks during channel reconditioning.

C.9.c Alternative 2 and Alternative 3 - Proposed Action

Construction activities affecting site geology and soils resulting from Alternatives 2 and 3 would include erosion, and disturbance of pyritic rocks.

C.9.c.1 Direct and Indirect Effects

Alternatives 2 and 3 would require substantially more grading than Alternative 1 (Table IV.C.9.1). This is due to development of the left

bank land outside the existing river bed (USDA, 1993). All other facilities would be constructed on limestone fill or on existing grade. Soils would remain relatively stable after construction because they would be overlain by facilities, pavement, or vegetation that would minimize erosion. Removal of the temporary facilities would cause increased erosion due to increased construction traffic and removal of the stabilizing structures, but is estimated to be less than Alternative 1 (see also Section IV.C.10).

The broadcast compound, spectator services, and Olympic facilities areas to be graded are located on areas of known acid-producing rock. Grading at these areas should follow the guidelines listed for acid-drainage mitigation measures common to Alternatives 1, 2, and 3.

The potential increase in surface water acidity associated with exposure of sulfidic rocks in Alternative 2 appears to be minimal in terms of the existing pH levels of the Ocoee River. The effects of acidic drainage are addressed in Section IV.C.10, Water Quality.

Soils would remain relatively stable after construction because they would be overlain by facilities, pavement, or vegetation that would minimize erosion. Removal of the temporary facilities would cause increased erosion due to increased construction traffic. The potential release of sediments at the Olympic Venue attributable to construction is not considered to be a significant effect. Erosion control methods would be employed as discussed in Section C.9.a.3. Erosion and sedimentation is addressed with water quality in Section IV.C.10.

C.9.c.2 Cumulative effects associated with the disturbance of the geology and soils in the area proposed for Olympic development and areas draining to the Ocoee River are those common to Alternatives 1, 2, and 3.

C.9.c.3 Mitigation Measures

Mitigation measures proposed are those common to Alternatives 1, 2, and 3. Additional precautionary measures would be required in the broadcast compound and athletes areas.

C.9.d Alternative 4 - No Action

An Olympic event would not be held on the Ocoee River under this alternative. Acidic drainage in disturbed areas would be expected to continue unless control measures are instituted. Direct, indirect, and cumulative effects would be associated with the acid drainage potential linked to disturbances such as road cuts and parking areas along U.S. Highway 64. Potential mitigation measures that have been incorporated into other road con-

struction projects located in areas with similar pyritic rocks are described in Section C.9.a.3.

C.10 Hydrology

This section of the EIS assesses effects of the alternatives on area hydrology. For each alternative, six parameters have been examined: climatic conditions, watershed conditions, channel stability (including flood scenarios), water availability, surface water quality, and sediment quality. Assessment matrices for the parameters analyzed are included in subsections addressing water availability, and water quality.

C.10.a Effects Common To Alternatives 1, 2, and 3

Four parameters examined would be similarly affected by each of Alternatives 1, 2, and 3: climatic conditions, sediment quality, water availability and water quality (suspended solids, acidity, and concentration of metals).

C.10.a.1 Direct and Indirect Effects

Climatic Conditions

Alternatives 1, 2, and 3 would result in no changes to the climatic conditions of the site area or region. Parameters such as atmospheric temperature, rainfall, and streamflow are expected to continue to follow historical trends, including the normal variability of extreme events.

Sediment Quality

Implementation of Alternatives 1, 2, and 3 is not likely to modify the quality of sediments at the proposed venue location, or in the downstream reaches of the Ocoee River. At the venue location, sediment quality would likely remain in its current condition or might improve as water is discharged from the Ocoee No. 3 Reservoir into the seasonally-dry river channel. Sediments deposited at the venue would be partially removed and replaced by soils from the watershed adjacent to the venue and sediments flushed from the Ocoee No. 3 Reservoir. Both the watershed soils, and upper sediments of the reservoir appear to have lower metals content than the existing venue sediments (Table III.A.10-5; Section III.10.e.4).

Development of the proposed Olympic venue site is not expected to modify sediment quality downstream from the venue location. The Ocoee No. 3 Reservoir would remain as a primary source of sediments for the lower reaches of the Ocoee River, as the current hydraulic regime of spring and summer discharges from the Ocoee No. 2 Dam would not be significantly modified.

Water Availability

According to TVA Reservoir Operations, a tentative water release schedule has been set for pre-Olympic and Olympic use, during 1995 and 1996. The schedule was based on operations of the white-water canoe and kayak pre-events and competitive events at the Barcelona, Spain Olympics in 1992. TVA has estimated that releases from Ocoee No. 3 Reservoir into the riverbed will be required for a total of 147 (8-hour) days for both years combined (Goranflo, 1993). At an estimated flow of 1,600 cfs, this would be a flow of approximately 77,752 acre-feet/year, or 155,504 acre-feet of water for both years combined. (An acre-foot is the volume that would cover 1 acre to an average depth of 1 foot.) The total flow of the river for that same time period and flow rate, but at 24 hours per day, would be approximately 1.16 million acre-feet/yr, or 2.32 million acre-feet of water for both years combined. Therefore, for the time period 1995-1996, releases into the riverbed diverting water from the powerhouse would cause a 6.7 percent decrease in water availability from Ocoee No. 3. for those 2 years. Table IV.C.10-1 summarizes the water availability effects for all of the alternatives, expressed as percent change from baseline.

Alternatives 1, 2, and 3 would result in limited and temporary modification of the existing flows and operations on the Ocoee River between Ocoee No. 3 Dam and No. 2 Dam. During the time the proposed competitive channel is operating, which would be during the daylight hours only, TVA would have to release water into the streambed instead of into the tunnel which normally bypasses the natural riverbed. Releasing water to the riverbed would necessitate bypassing Ocoee No. 3 Powerhouse, making power generation unachievable from that powerhouse while the proposed competitive channel is running. After the Olympic events are ended, power generation from Ocoee No. 3 Powerhouse would begin again with no interruptions.

TVA compiled a preliminary assessment summary of the potential power and operational effects of recreational release alternatives at Ocoee No. 3 Dam (Brooks, 1992). The assessment reflects that operation of the proposed competitive channel would result in power losses to the TVA system. The Ocoee No. 3 Powerhouse would be bypassed, and power generation would be shifted from peak to off-peak periods at the Blue Ridge and Ocoee No. 2 Powerhouses. Additional effects include both a small dependable-capacity loss and the cost of Ocoee plant personnel to provide the channel releases. These effects have not been quantified by TVA, but are discussed below.

TABLE IV.C.10-1
Surface Water Hydrology Assessment Matrix

Evaluation Criteria	Unit of Measurement	Alternatives			
		1	2	3	4
Decrease in ground permeability and increase in run-off volumes	Percent change from baseline	0	2.6	6.4	0
Decrease in water availability from Ocoee No. 3 Reservoir (diversion from power house)	Percent change from baseline	6.7 ^a	6.7 ^a	6.7 ^a	0
Increase in maximum water depth	Percent change from baseline	46	46	46	0

Sources: Flows for 1995-1996: (Goranflow, 1993)
Flows for addition 27 years (1997-2021): (Brooks, 1992)

a Assuming 1,600 cfs flow, 147 days total, 8 hours per day, 1995-1996.

For the 147 8-hour days (total) that the proposed competitive channel would be operating, operations at Blue Ridge Lake and Ocoee No. 2 Powerhouses, in addition to Ocoee No. 3, would be affected. Ocoee No. 3 does not have sufficient storage capacity to provide all of the desired releases for the current Ocoee No. 2 Dam recreational schedule and the additional Ocoee No. 3 Dam Olympic schedule. Careful coordination of releases from each reservoir would be necessary to ensure that sufficient water would be available at the scheduled times, and to avoid flow conditions adverse to recreational whitewater activities. Because of the geographic locations and the resulting travel times between the reservoirs, Blue Ridge Lake would have to release water for a few hours early in the morning to ensure sufficient water downstream for Ocoee No. 3 releases occurring later in the day.

Normal hydropower releases from Ocoee No. 3, combined with local inflows, currently provide sufficient water for the whitewater recreational releases at Ocoee No. 2. Use of water stored in Blue Ridge Lake could be required to provide the Ocoee No. 3 recreational flows, which could conceivably lower the lake level; however, this effect should be negligible, unless drought conditions are experienced in 1995 and/or 1996. If drought conditions occur during 1995 and/or 1996, TVA would use water from Blue Ridge Reservoir to supply the competitive channel. TVA has stated that the largest potential effect on Blue Ridge Lake levels would likely be a 1-foot drop (from normal pool elevations) in very dry years. (Brooks, 1992.)

In order to calculate the costs of the recreational releases on the Ocoee River, TVA conducted operational studies of the river system, which showed that almost 8 million kilowatt kWh of hydroelectric energy would be lost in a 26-day time period in the summer to provide recreational releases below Ocoee No. 3 (Jensen, 1993). Extrapolating from this figure, the proposed 147 days of 1995-1996 releases below Ocoee No. 3 Dam would cause a loss of about 45 million kWh of hydroelectric energy over the 2-year period the proposed competitive channel would be in operation. In addition to the lost power from the Ocoee No. 3 Powerhouse, a small amount of power generation would be shifted from peak periods to off-peak periods at the Blue Ridge, Ocoee No. 2, and Ocoee No. 3 projects, and a small loss of dependable power generating capacity would be incurred at the Blue Ridge project. The shift from peak power generation to off-peak would result in decreased revenue to TVA for the times that the proposed competitive channel is in operation.

The losses in power were evaluated by determining the alternative cost of producing that power.

The cost to provide the Ocoee No. 3 recreational releases was generally based on replacement energy costs from TVA's coal-fired power plants. TVA did not quantify, in dollars, the cost of the lost power generation associated with running the proposed competitive channel. These effects would be temporary in nature, however, and should have no lasting effects on the Ocoee River project flows and operations.

Water Quality

Water Acidity. Based on the acid-release potential from rock samples analyzed from the venue site, the potential increase in water acidity in the Ocoee River associated with venue construction activities was calculated. Out of 33 rock samples analyzed, 13 had an acid-release potential, with an estimated average value of 20 grams of acid release per kilogram of rock (see Appendix G-6). Assuming a worst-case scenario for erosion losses of 150 tons per acre per year of construction, the potential acid release would range from 49.1 kg (49,116 g CaCO_3/day) for Alternative 1 to 85.2 kg (85,271 g $\text{Ca CO}_3/\text{day}$) for Alternative 3 (Table IV.C.10-2). The erosion rate calculation is based on estimates of the Polk County Soil Conservation Service (1993) and for comparison purposes, assumes that best management practices would not be used during construction. With the use of required best management practices, the expected erosion rate at the venue site would be 10 tons/acre year (Polk County Soil Conservation Service, 1993).

Based on conservative assumptions on erosion rates and a baseline flow of 40 cfs, none of the proposed venue construction alternatives would significantly modify the acidity of the Ocoee River (Table IV.C.10-2). The estimated increase in water acidity is less than 1 mg/L for all construction scenarios considered. Such small increases in water acidity are not expected to significantly modify the water pH, despite the low buffering capacity of the water. For Alternatives 1, 2, and 3, the calculated baseline pH value of 6.37 would not be reduced by more than 0.05 units (Table IV.C.10.2), even under worst case conditions. With the use of best management practices, the projected change in pH would be less than 0.05 units.

Concentration of Metals. An increase in dissolved metals in the water, a potential source of toxicity to aquatic organisms, is not anticipated because the expected increase in suspended solids is relatively low, and the water pH would be likely to remain unmodified. Increased dissolution of metals released in particulate form would be unlikely without significant acidification of the river water.

In terms of use of Ocoee River waters for recreational purposes, detected concentrations of metals and cyanide are expected to remain below EPA's guidelines for drinking waters and health advisories (EPA, 1992) (Table II.A.10-2). These guidelines, which exceed safety requirements for water contact activities, are also intended to protect users from consumption of contaminated fish.

C.10.a.2 Cumulative Effects

Alternatives 1, 2, and 3 would have no cumulative effects on climatic conditions. Based on the discontinued TVA practice of sluicing, sediment quality conditions would be expected to improve with increased water discharges into the upper Ocoee River. It is unknown at this time what methods TVA would use in the future to remove sediments from Ocoee No. 3 Reservoir.

The cumulative effects associated with the Olympic event are minimal. While Olympic Venue construction would cause erosion, sedimentation control measures would effectively reduce this impact.

C.10.a.3 Mitigation Measures

Use of best management practices would be required to minimize the release of sediments during construction and reconditioning. The project construction plan would incorporate a storm water pollution prevention plan that meets or exceeds EPA requirements for construction projects, as specified in the document *"Storm Water Management for Construction Activities"* (EPA 1992b). The pollution prevention plan, which would be reviewed by EPA as a requirement for issuing a NPDES permit for construction of the proposed venue, would include calculations of runoff and erosion rates, review of Federal, State, and local requirements, determination of required erosion control structures and management practices, and a plan for compliance inspections and maintenance of control structures. Available structural control measures include, but are not limited to, the use of earth dikes, silt fences, sediment traps, and sediment basins. Best management practices would include the proper storage of materials, adequate disposal of construction site waste materials, stabilization of construction access sites, prevention of nonstorm water discharges, minimization of land disturbance, prompt stabilization of exposed areas, and scheduling construction activities to limit the effects of heavy rains.

Significant effects on water quality conditions as a result of acid releases from exposed pyritic rocks were not identified (Table IV.C.10.2). However, as a best management practice, the locations of those rock formations would be identified in

the venue construction plans, and their disturbance would be avoided to the extent possible (see also Section C.9, Geology and Soils). The proposed fill material for course construction is limestone, which would also reduce potential effects due to acidic drainage.

C.10.b Alternative 1

Effects associated with construction, operation, and reconditioning of the Olympic site are detailed below for characteristics of the watershed, channel stability, water availability, and water quality.

C.10.b.1 Direct and Indirect Effects

Watershed

Minimal grading would occur under this alternative, all of which would be associated with constructing the proposed competitive channel. The only improvements slated to remain post-Olympics are parking facilities located on the right bank. According to the Design Report (USDA, 1993) these parking facilities would occupy approximately 17,000 ft² (0.4 acre), would be gravel, and not asphalted. Therefore, there should be no significant change in ground permeability as a result of this alternative (see Table IV.C.10-1). Since increases in rainfall run-off are directly proportional to the area modified, negligible rainfall run-off increase would be contributed to the stream flow.

The minimal proposed development and its temporary nature would result in no substantive changes to the existing watershed. No large tracts of forested land would be cleared that would potentially affect the area watershed. Current stream flows into the Ocoee River would not be changed as a result of the project; therefore, the only direct effect on the watershed from Alternative 1 would be a very slight decrease in ground permeability adjacent to the riverbed while the temporary structures are in place (see Table IV.C.10-1).

Channel Stability

The existing natural channel of the Ocoee River in the area of the proposed competitive channel is described in Section III.A.10.c, Channel Stability. As described in the Design Report, (USDA, 1993) the proposed competitive channel construction would reduce the river width from 150-200 feet to 70-90 feet. Coarse limestone rock would be used to fill the river to the rough dimensions of the proposed channel, which would then be faced with rounded river rocks. The irregularly-shaped and heterogeneous fill material would resist washout by floods (USDA, 1993). The fill zone would be capped with river cobbles and a superficial soil layer. Native grasses and plant material would be

TABLE IV.C.10-2
Summary of Water Depths From ADYN Model Runs
Ocoee River, Polk Co., TN

Ocoee River Mile (ORM)	1,600 cfs		1,400 cfs		100 - Year Flood		500 - Year Flood	
	Existing Depth (ft.)	Competitive Channel Depth (ft.)	Existing Depth (ft.)	Competitive Channel Depth (ft.)	Existing Depth (ft.)	Competitive Channel Depth (ft.)	Existing Depth (ft.)	Competitive Channel Depth (ft.)
29.10	2.65	2.65	2.44	2.44	1.99	1.98	2.32	2.32
26.89	9.28	8.35	8.96	8.29	8.97	8.28	9.22	8.45
26.79	1.97	2.17	1.96	2.01	2.06	2.09	2.18	2.37
26.70	5.45	5.90	5.72	5.58	5.91	5.79	5.87	6.22
26.60	4.71	4.81	4.54	4.51	4.75	4.74	5.22	5.64
26.51	5.29	4.25	4.71	4.11	4.90	4.21	4.69	4.15
26.41	4.01	4.69	3.84	4.49	4.05	4.67	4.56	5.33
26.32	3.57	5.03	3.26	4.75	3.53	5.00	3.23	4.48
26.23	3.30	2.78	2.61	2.61	2.86	2.79	4.23	4.00
26.13	2.60	2.88	2.68	2.68	2.96	2.88	11.49	11.83
26.04	5.78	6.62	6.30	6.29	6.87	6.74	21.30	21.68
25.00	23.79	23.91	23.46	23.46	24.91	24.79	44.32	44.60
24.90	19.01	19.10	18.80	18.80	19.76	19.70	32.26	32.45
24.65	14.51	14.52	14.42	14.42	14.77	14.78	18.04	18.10
24.20	39.13	39.13	39.03	39.03	39.36	39.37	41.94	41.99

Note: 100 - Year Hydrograph Peak = 18,000 cfs
+500 - Year Hydrograph Peak = 43,500 cfs

introduced to prevent excessive scouring of the soil layer during floods.

In order to determine the baseline conditions and potential effects of construction and use of the proposed competitive channel on channel stability, a flow model developed by the TVA Engineering Laboratory was used, applying data provided by TVA, Forest Service, and from U.S. Geological Survey (USGS) topographic maps. This model, ADYN, is used by TVA to predict water surface elevations from reservoir releases. A description of this model is presented in Appendix G-6.

To evaluate the effects of Alternative 1, ADYN was used to predict the water surface profile for the new channel geometry of the proposed competitive channel. The cross-sections for the proposed competitive channel were developed from the Design Report (USDA, 1993). A summary of the resulting water depths at the selected river stations is shown on Table IV.C.10-3.

The projected flow rates for the proposed competitive channel (1,400 cfs and 1,600 cfs) were used to estimate the water surface profile for the river reach between river mile 29.1 to river mile 24.6. The proposed whitewater venue is located between river mile 26.2 and 26.8. River mile 29.1 is approximately 3 miles upstream of the proposed competitive channel, and river mile 24.6 is about 2 miles downstream of the proposed competitive channel. The input flow rates were held at a constant rate for 8 hours, to correspond with the proposed (tentative) release schedule.

The resulting water surface profiles along the reach for 1,400 cfs and 1,600 cfs are shown in Figure IV.C.10-1. This figure depicts the elevations of the channel bottom, the existing water surface profile, and the water surface profile of the constructed channel. As shown in this figure, water depths in the constructed channel closely parallel the existing water surface profile. Expanded views of the water surface profile in the proposed competitive channel area, where the highest resolution topographic maps were used to develop input channel geometry, are shown in Figure IV.C.10-2.

Similarly, the water surface profiles for the existing channel were developed for the 100-year and +500-year floods (18,000 cfs and 43,500 cfs, respectively); Section III.10.c.3 contains a description of the existing natural channel of the Ocoee River in the area of the proposed competitive channel. The resulting water surface profiles along the reach for the 100-year and +500-year floods are shown in Figure IV.C.10-3. Water depths in the constructed channel closely parallel the existing water surface profile. Expanded views of the water surface profile

in the proposed competitive channel area are shown in Figure IV.C.10-4.

In the area proposed for the competitive channel, the water depth ranges between 4 and 20 feet. The predicted water surface elevation for the 100-year flood is approximately 7 feet below the elevation of the roadway at river mile 26.13. For the +500-year flood event, the water surface elevation at river mile 26.13 is approximately 2 feet above the elevation of U.S. Highway 64.

The maximum percent change in water surface elevation from the baseline conditions for all discharge scenarios would occur at river mile 26.32, within the competitive channel. This maximum value would be approximately 46 percent greater than the existing water surface elevation during discharges of 1,400 cfs, and indicates that the water depth would increase by almost 1.5 feet (from 3.26 feet to 4.75 feet).

Prior to any construction or fill, a "No-Rise" certification would be required. As part of the supporting data for the No-Rise certificate, a specific computer water model from FEMA would be utilized to determine the 100-year floodway elevations for revised existing conditions at the proposed site. At that time, additional information would be available regarding the floodway and floodplain delineations for the site area. The No-Rise certificate, which is signed and sealed by a professional engineer, stipulates that a proposed development will not affect the 100-year flood elevations, floodway elevations, and floodway widths on the waterway of concern in the vicinity of the proposed development. Although FEMA is the acting agency concerning the No-Rise regulations and determines the areas susceptible to flooding, Polk County issues the No-Rise permit and enforces the FEMA regulations. Information regarding the No-Rise certificate is summarized in Appendix H, Permitting Requirements.

Although higher water velocities will increase the potential for erosion and scour, the temporary nature of the proposed competitive channel for Alternative 1 (2 years) should have a minimal effect on channel stability. Flood events creating high velocities may contribute to additional sediment transport downstream. However, this effect would be considered minor.

Water Quality

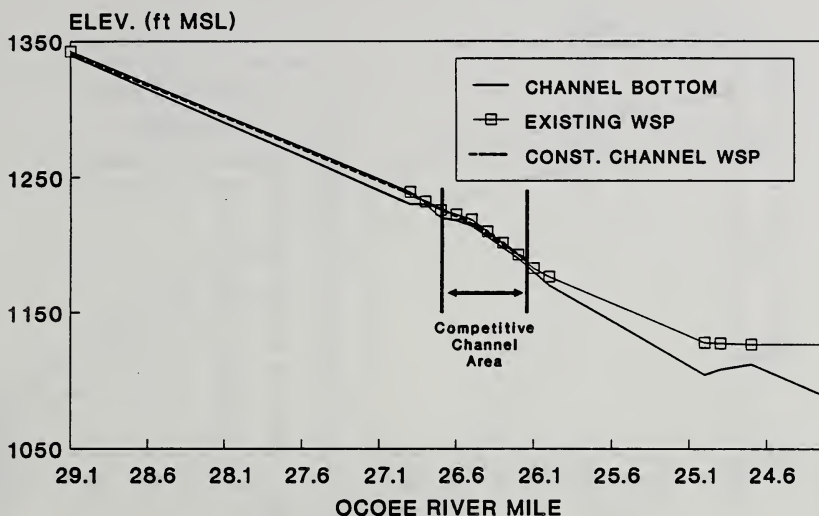
Water quality of the Ocoee River at the venue site would not be significantly modified in terms of acidity or dissolved metals (Section IV.C.10.a.1). However, construction activities would be expected to increase the suspended solids load, particularly during the site reconditioning phase. With the use

TABLE IV.C.10-3
Summary of Water Depths From ADYN Model Runs for the Ocoee River

Ocoee River Mile	1,600 cfs		1,400 cfs		100 - Year Flood		+500 - Year Flood	
	Existing Depth (ft.)	Competitive Channel Depth (ft.)	Existing Depth (ft.)	Competitive Channel Depth (ft.)	Existing Depth (ft.)	Competitive Channel Depth (ft.)	Existing Depth (ft.)	Competitive Channel Depth (ft.)
29.10	2.65	2.65	2.44	2.44	1.99	1.98	2.32	2.32
26.89	9.28	8.35	8.96	8.29	8.97	8.28	9.22	8.45
26.79	1.97	2.17	1.96	2.01	2.06	2.09	2.18	2.37
26.70	5.45	5.90	5.72	5.58	5.91	5.79	5.87	6.22
26.60	4.71	4.81	4.54	4.51	4.75	4.74	5.22	5.64
26.51	5.29	4.25	4.71	4.11	4.90	4.21	4.69	4.15
26.41	4.01	4.69	3.84	4.49	4.05	4.67	4.56	5.33
26.32	3.57	5.03	3.26	4.75	3.53	5.00	3.23	4.48
26.23	3.30	2.78	2.61	2.61	2.86	2.79	4.23	4.00
26.13	2.60	2.88	2.68	2.68	2.96	2.88	11.49	11.83
26.04	5.78	6.62	6.30	6.29	6.87	6.74	21.30	21.68
25.00	23.79	23.91	23.46	23.46	24.91	24.79	44.32	44.60
24.90	19.01	19.10	18.80	18.80	19.76	19.70	32.26	32.45
24.65	14.51	14.52	14.42	14.42	14.77	14.78	18.04	18.10
24.20	39.13	39.13	39.03	39.03	39.36	39.37	41.94	41.99

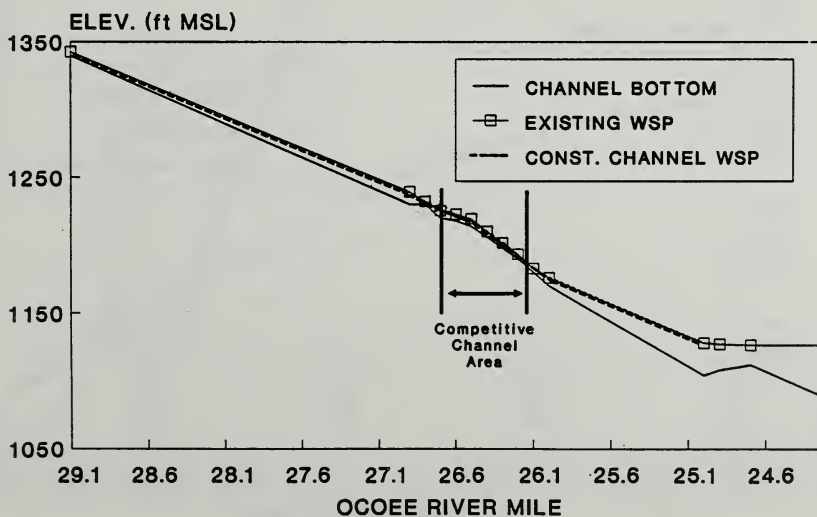
Note: 100 - Year Hydrograph Peak = 18,000 cfs
+500 - Year Hydrograph Peak = 43,500 cfs

Figure IV. C.10-1
Water Surface Profile - 1,400 cfs
Ocoee No. 3 To Ocoee No. 2, Polk Co., TN



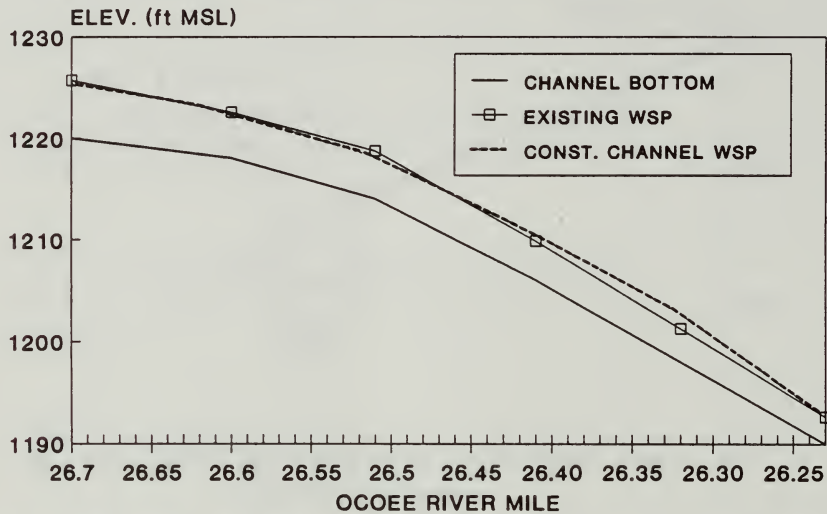
Note: Constant flow = 1,400 cfs
WSP = Water Surface Profile

Water Surface Profile - 1,600 cfs
Ocoee No. 3 To Ocoee No. 2, Polk Co., TN



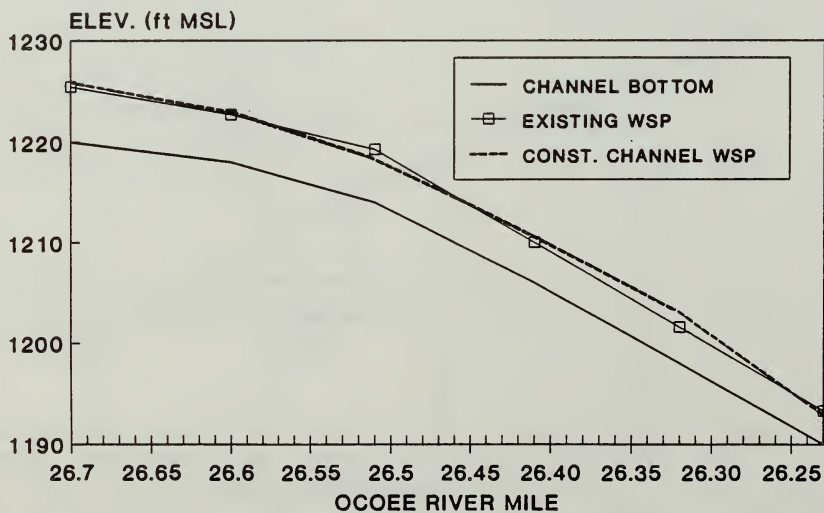
Note: Constant flow = 1,600 cfs
WSP = Water Surface Profile

Figure IV. C.10-2
Competitive Channel Area
Water Surface Profile - 1,400 cfs



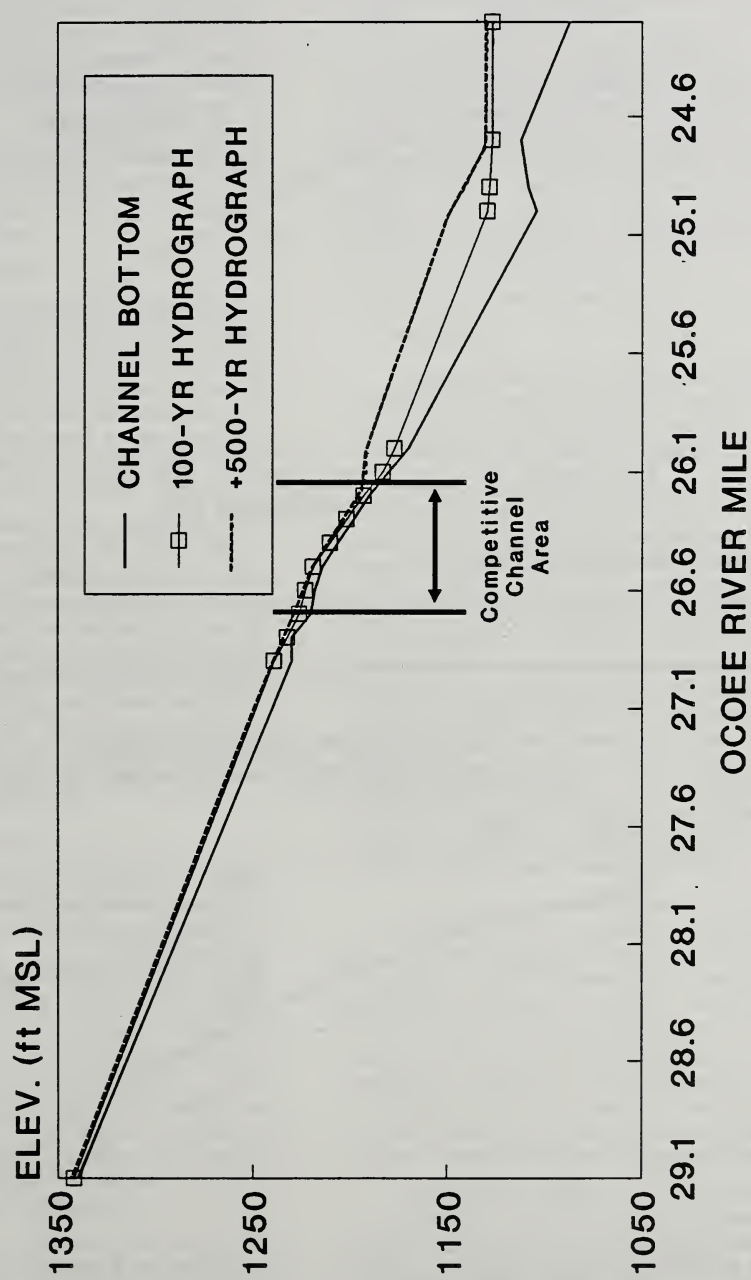
Note: Constant flow = 1,400 cfs
WSP = Water Surface Profile

Competitive Channel Area
Water Surface Profile - 1,600 cfs



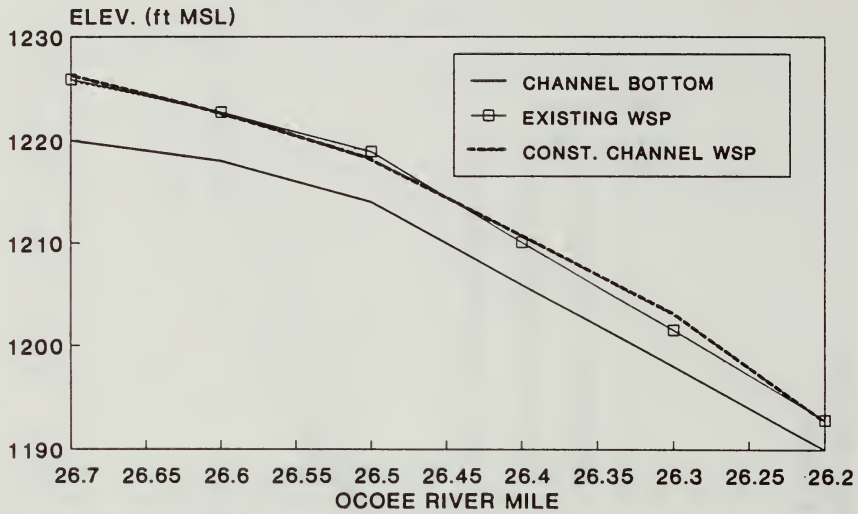
Note: Constant flow = 1,600 cfs
WSP = Water Surface Profile

Figure IV. C.10-3
Existing Channel Water Surface Profiles
100-Year and +500-Year Floods



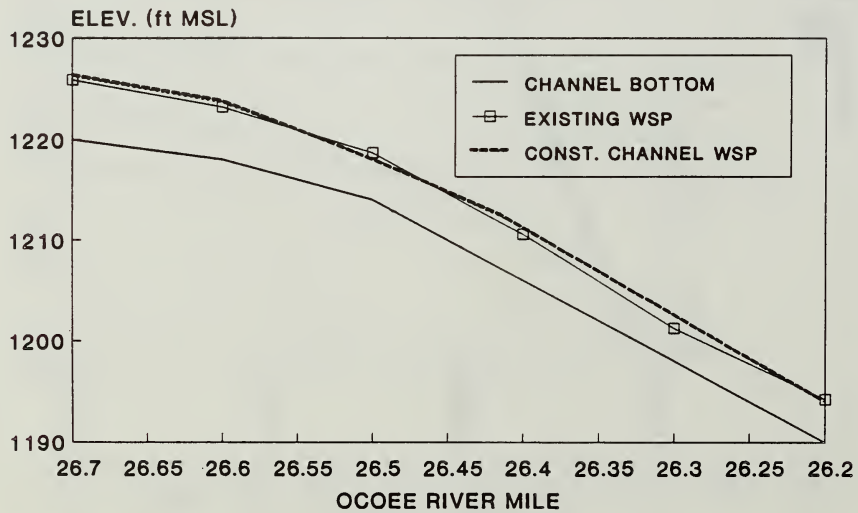
Ocoee No. 3 to Ocoee No. 2, Polk Co., TN
 100-year hydrograph peak = 18,000 cfs
 +500-year hydrograph peak = 43,500 cfs

Figure IV. C.10-4
Competitive Channel Area
Water Surface Profile - 100 Year Flood



Note: Peak flow = 18,000 cfs
WSP = Water Surface Profile

Competitive Channel Area
Water Surface Profile - +500 Year Flood



Note: Peak flow = 43,500 cfs
WSP = Water Surface Profile

of typical best management practices for sediment control, site reconditioning following the Olympic events would be expected to increase the concentration of suspended solids to 56 mg/L, near 400 percent over the 14 mg/L baseline value (Table IV.C.10.4). This increase in water turbidity over an estimated 6-month site reconditioning period would be considered temporary. The projected increase in suspended solids load would be considered to have a minor negative effect to aquatic life. Recovery of the aquatic community in this portion of the river would be temporarily delayed during course construction and reconditioning.

C.10.b.2 Cumulative Effects

No cumulative effects on the area watershed or water quality were identified for Alternative 1. This alternative should not have cumulative effects on channel stability because of its temporary nature (2 years only). After the Olympics are over, the proposed competitive channel would be removed, and the river would be restored to near-baseline conditions.

The short-term effects of this alternative (6.7 percent less water availability to Ocoee No. 3 Powerhouse) on water availability should not have cumulative effects to the system because of their temporary nature (2 years) and the fact that the hydropower unit at Ocoee No. 3 Powerhouse supplies about 0.8 percent of the total TVA generating capacity. Effects on Blue Ridge Lake levels should be negligible, unless 1995 and 1996 are very dry years. Blue Ridge Lake levels may decrease by 1 foot if 1995 and 1996 are drought years, which could affect marinas and adjacent landowners.

C.10.b.3 Mitigation Measures

Although no substantive environmental effects on the area watershed are identified for Alternative 1, use of best management practices during construction phases would be required for assurance that the area would be returned to near-baseline conditions following the Olympic events. In addition, during the period that the proposed competitive channel is operating, the construction of the channel as reported in the Design Report (USDA, 1993) would minimize or mitigate sediment transport and deposition downstream, as it would be constructed to resist washout by floods. Native plant material also would be introduced to prevent excessive scouring of the soil layer during floods.

The environmental effects on water availability for Alternative 1, are estimated to be temporary; however, further refining of the hours actually needed to run the proposed competitive channel for pre-event and Olympic events could potentially re-

duce the effects by reducing the number of days that releases from Ocoee No. 3 Reservoir are required.

C.10.c Alternative 2 and Alternative 3 - Proposed Action

The effects on hydrologic resources would be approximately the same for Alternatives 2 and 3 because as each alternative is predicated upon a permanent channel and similar acreages of land to be disturbed by construction activities. Effects associated with construction and operation of the Olympic Venue site are detailed below for characteristics of the watershed, channel stability, water availability, and water quality.

C.10.c.1 Direct and Indirect Effects

Watershed

Alternatives 2 and 3 would result in permanent modification of the river channel between river mile 26.13 and river mile 26.70. Temporary structures would be removed directly after the 1996 Olympics.

The facilities under Alternatives 2 and 3 to remain after the Olympic events would reduce site permeability. The area occupied by these improvements has been calculated from the Design Report (USDA, 1993) to be approximately 34,300 ft² (0.8 acre) and 85,100 ft² (1.95 acres) for Alternatives 2 and 3, respectively. Since the area in which these improvements would be located occupies a total of 30.6 acres, the change in ground cover permeability would be approximately 2.6 percent and 6.4 percent of the total for Alternatives 2 and 3, respectively (Table IV.C.10-1). These slight percentage changes should not affect the area watershed. Since increases in rainfall run-off are directly proportional to the area modified, negligible rainfall run-off increases would be contributed to the flow.

The permanent development proposed for either Alternative 2 or Alternative 3 would result in no substantive changes in the existing watershed. No large tracts of forested land would be cleared that could potentially affect the area watershed. Current stream flows into the Ocoee River would not be changed as a result of the project. Structures proposed to remain after the event would result in a very slight decrease in ground permeability adjacent to the riverbed. On balance, the watershed would remain as described under existing conditions.

Development within the Copper Basin area may occur as a result of the Olympic event. Due to soil conditions in the region, additional erosion could be expected to occur. Erosion and sedimentation could be avoided with implementation of appropriate structural measures.

TABLE IV.C.10.4
Estimated Sediment Release Into the Ocoee River

	Units	During Venue Construction	During Site Reconditioning
BASIS FOR CALCULATION			
Assumed loss of topsoil/grading material (1)	percent	3	3
Baseline flow rate (2)	m3/d	97,874	97,874
Exposure period (3)	days/year	270	180
ALTERNATIVE 1			
Topsoil and grading material mobilized (4)	cubic yards	7,600	72,100
Sediments released during mobilization (5)	metric tons	104	983
Suspended solids load (6)	tons/day	0.38	5.46
Increase in suspended solids (7)	mg/L	3.9	55.8
Increase over baseline conditions (8)	percent	28	399
ALTERNATIVE 2			
Topsoil and grading material mobilized (4)	cubic yards	23,050	9,700
Sediments released during mobilization (5)	metric tons	314	132
Suspended solids load (6)	tons/day	1.16	0.73
Increase in suspended solids (7)	mg/L	11.9	7.5
Increase over baseline conditions (8)	percent	85	54
ALTERNATIVE 3			
Topsoil and grading material mobilized (4)	cubic yards	20,204	0
Sediments released during mobilization (5)	metric tons	276	0
Suspended solids load (6)	tons/day	1.02	0
Increase in suspended solids (7)	mg/L	10.4	0
Increase over baseline conditions (8)	percent	74	0

1. With the use of required best management practices for construction projects, an erosion rate of 10 tons/acre-year was estimated by the Polk County Soil Conservation Service for the predominant soils at the venue location (Cataska soils, with slopes less than 15 %). These management practices will limit sediment losses to less than 5% of the mobilized soils. (Presenger, 1993)
2. Baseline flow of 40 cfs at the venue site, from TVA's ADYN runoff simulation model.
3. Assumes a 9-month construction period, and a 6-month site reconditioning period.
4. Data from Table IV.C.17-1. Construction estimates include material used for grading and earth fill; site reconditioning estimates refer to spoil disposal. Significant mobilization of soils is not expected during the Olympic events, once construction is completed.
5. Material released was calculated as the volume of soil lost, assuming a typical density of 1000 lb/cy for clay soils (Peck et. al. 1974),
6. Load calculated as the rate of material release per day of construction.
7. Ratio of daily sediment load to daily baseline flow at the venue site.
8. The calculation assumes a baseline value of 14 mg/L suspended solids reported for the Ocoee river mile 19.6; TDHE data for 1984-1989 (Cox, 1990).

Channel Stability

Because the primary difference among the alternatives, with respect to hydrology, is the duration of use, and not the geometry of the proposed competitive channel, the direct effects of flooding for Alternatives 2 and 3 are identical to the effects for Alternative 1.

Although higher velocities would increase the potential for erosion and scour, the combined effects of the proposed channel design, native base material (bedrock), materials of construction, and operation schedule should not significantly contribute to sediment transport. As noted in Chapter III.A.10, Channel Stability, erosion from small watersheds within Copper Basin has caused loss of Ocoee reservoir storage capacities because of sediment accumulation. The relative sediment contribution of either Alternative 2 or 3 would be negligible. Estimates of sediment quantities are summarized in Table IV.C.10-4.

Water Availability

The availability of water is described under Section C.10.a, Effects Common to Alternatives 1, 2, and 3.

Water Quality

Water quality conditions of the Ocoee River at the proposed venue site would not be significantly modified in terms of acidity, suspended solids, or dissolved metals (see also Section IV.C.10.a). However, a moderate increase in suspended solids load would be expected during construction activities. With the use of typical best management practices for sediment control, site reconditioning following the Olympic events would be expected to increase the suspended solids load less than 12 mg/L over the 14 mg/L baseline value (Table IV.C.10.4). This short-term increase in water turbidity is well within seasonal variations (from 1 to 148 mg/L; Cox, 1990) in suspended solids reported for the free-flowing (river mile 19.6) section of the Ocoee River. The moderate increase in suspended solids is not likely to hinder recovery of aquatic communities which, according to results of a January 1993 field survey, are nearly absent from the Ocoee River at the venue site. The increase in the suspended solids load would be considered temporary.

No significant effects on water quality conditions were identified for Alternatives 2 and 3 at the proposed venue location, or downstream from the project site. This conclusion is based on the close similarity in construction requirements for Alternatives 2 and 3.

C.10.c.2 Cumulative Effects

No cumulative effects on the area watershed were identified for Alternatives 2 or 3. Potential increases in sediment deposition rates in Parkesville Lake would result in a decrease in the effective life of the reservoir; however, the relative contribution from Alternative 2 or 3 would be negligible when compared to the existing deposition rates. Although higher velocities would increase the potential for erosion and scour, the combined effects of the proposed channel design, native base material (bedrock), materials of construction, and operation schedule preclude any significant cumulative effects from the proposed channel regarding sediment transport and deposition. Alternatives 2 and 3 would not have any cumulative effects on channel stability.

The effect of these alternatives (6.7 percent less water availability to Ocoee No. 3 Powerhouse) on water availability should not be significant because Ocoee No. 3 Powerhouse supplies 0.8 percent of the total TVA generating capacity. Effects on Blue Ridge Lake levels should be negligible, unless 1995 and 1996 are very dry years. Blue Ridge Lake levels might decrease by 1 foot if 1995 and 1996 are drought years, which could affect marinas and, possibly, adjacent landowners. No cumulative effects on the area water quality conditions were identified for Alternatives 2 and 3.

C.10.c.3 Mitigation Measures

Although the environmental effects on channel stability as estimated would be limited, best management practices during the construction phases would be implemented to minimize sediment transport. These practices would include minimization of sediment release from construction areas, and capping of any large exposed pyrite rock formations. The proposed project would incorporate the use of limestone as a mitigation measure for potential release of acidic drainage.

In addition, during the period that the proposed competitive channel is in use, the materials of construction of the channel would minimize sediment transport and deposition downstream, as the channel would be constructed to resist washout by floods (USDA, 1993). Native plant material would be introduced to prevent excessive scouring of the soil layer during floods. In addition to plants, the floodplain would be seeded with large river rocks and ledges rising above the fill, which would provide both a buffer against flood waters and soil pockets for a long-term plant habitat. The freeboard of the channel would be calculated to contain only the annual flood occurrence.

A potential water availability mitigation measure for maintaining the Blue Ridge Lake level during periods of extended drought would be to temporarily suspend or reduce recreational releases from Ocoee No. 3, if necessary. However, the maximum drop in Blue Ridge Lake levels is estimated to be 1 foot in a very dry year. Additional mitigation measures are provided in Section C.10.a-3.

C.10.d Alternative 4 - No Action

The no-action alternative assumes that the Olympic event would not be held on the Ocoee River, and therefore no facilities would be constructed.

C.10.d.1 Direct and Indirect Effects

Watershed

Alternative 4 would result in no Olympic related changes to the watershed. Therefore, there would be no direct effects on the watershed, and it would remain as described in Chapter III.A.10.

Channel Stability

Alternative 4 would result in no changes to the river channel, and therefore erosion, sedimentation, or flood-potential conditions would not be expected to change. The current conditions, as described in Chapter III.A.10.c. would continue. Unless an acceptable alternative(s) to sluicing operations at Ocoee No. 3 Reservoir is found, the intakes to Ocoee No. 3 Powerhouse tunnel would become blocked, and the powerhouse would be forced out of service. TVA is currently evaluating alternatives to sluicing to alleviate the sediment build-up.

Water Availability

Alternative 4 would result in no changes to the current flows and operations on the Ocoee River, and therefore water availability for power generation and whitewater recreation would remain consistent with current use. The current conditions, as described in Chapter III.A.10.d, would prevail unless TVA altered flow conditions at its discretion.

Water Quality

Water quality conditions downstream from the proposed Olympic Venue would be expected to gradually improve as watershed conditions improve and sluicing operations cease. Conditions on-site would likely remain due to sediment quality and water diversion. Acidic drainage linked to disturbances such as road cuts and parking areas along U.S. Highway 64 would be expected to continue unless control measures are used.

C.10.d.2 Cumulative Effects

Long-term sediment build-up at the intakes of Ocoee No. 3 Powerhouse tunnel may cause this system to be taken out of service until the sediments can be removed by an acceptable method. No cumulative effects on water availability or channel conditions are expected. Past disturbances in the watershed would continue to effect the Ocoee River and reservoirs. Gradual improvements in the Ocoee River and reservoirs would be expected over the long-term.

C.10.d.3 Mitigation Measures

Mitigation measures that have been implemented at other road construction sites that could be incorporated along U.S. Highway 64 are summarized in Section IV.C.9, Geology and Soils.

C.11 Aquatic Resources

The lack of fish and invertebrate communities in the venue location, as documented during the January 1993 site survey, is expected to continue as long as existing limitations on sediment and water quality, substrate availability, and water availability remain. These conditions are not conducive to the development of significant aquatic communities. Effects on aquatic resources are also reflected in water quality assessment (Section IV.C.10).

C.11.a Effects Common To Alternatives 1, 2, and 3

While environmental effects on aquatic resources would vary by alternative at the Olympic Venue location, effects downstream would be the same for each development alternative.

C.11.a.1 Direct and Indirect Effects

Effects on the biota downstream from the proposed project site are expected to be temporary. The venue would not result in significant changes in substrate availability, quality of the water, or sediments. Historically, Lake Ocoee, also known as Parksville Lake, has been extremely unproductive in terms of fisheries, benthic communities, and phytoplanktonic algae populations that form the base of the aquatic food web. The biota in the water column of Lake Ocoee might undergo a gradual recovery in response to the expected improvement in water quality associated with watershed revegetation and control of upstream contaminant sources.

Current substrate availability for benthic organisms downstream from the project site would largely remain in its present condition because hydraulic conditions downstream from the proposed venue would not be modified. Surface area for attachment of sessile organisms would be lost as boulders are removed from the riverbed area where the Olympic

channel would be constructed. This effect is considered negligible due to the presence of extensive areas of similar substrate along several miles of the river course.

The covering of metal-laden sediments with new fill material over the proposed venue location is likely to provide a more adequate substrate for development of benthic communities.

C.11.a.2 Cumulative Effects

Since the Ocoee River receives drainage from an historically disturbed watershed, the cumulative effects associated with the Olympic event are minimal when compared to past practices. While Olympic Venue construction would cause erosion, structural control measures would reduce this effect. Long term conditions for aquatic measures are expected to improve as conditions in the watershed improve.

C.11.a.3 Mitigation Measures

Mitigation of the proposed effects of an increased suspended solids load are discussed in Section C.10.a.3. Best management practices would be required as well as stormwater control measures.

C.11.b Alternative 1

Effects on aquatic resources at the proposed venue location under Alternative 1 are discussed below. Water quality issues are discussed in Section IV.C.10.

C.11.b.1 Direct and Indirect Effects

Minor negative effects on aquatic biota are expected as a result of Alternative 1 implementation due to temporary construction and reconditioning related activities. Alternative 1 would partially modify current substrate availability for benthic organisms. During the 2 years, the discharged water would be routed through the modified river channel. The river flow associated with run-off from the watershed adjacent to the project area would not be modified.

Anticipated changes in the hydraulic regime could result in movement or covering of metal-laden sediments deposited during sluicing operations previously conducted. The increase in water availability associated with venue construction and operation would reduce the chronic exposure conditions of the riverbed and, in conjunction with the discontinuation of sluicing operations, provide a substrate better suited for development of stable aquatic communities. However, substrate changes associated with the modification of the river channel would be temporary in nature and not significant for the long-term establishment of aquatic biota under Alternative 1.

C.11.b.2 Cumulative Effects

Cumulative effects on aquatic resources are discussed in Section C.11.a.2.

C.11.b.3 Mitigation Measures

Mitigation measures proposed for Alternative 1 are discussed in Sections C.11.a.3 and C.10.a.3.

C.11.c Alternative 2 and Alternative 3 - Proposed Action

Alternatives 2 and 3 would modify current substrate availability for benthic organisms at the proposed venue location. As the competitive channel would be same for both alternatives, the effects are common to both alternatives.

C.11.c.1 Direct and Indirect Effects

Minor negative effects on aquatic biota would be expected as a result of implementing Alternatives 2 or 3 due to temporary construction related activities. The increased water flow could initially result in partial removal of metal-laden sediments deposited during sluicing operations previously conducted thereby improving conditions. The increase in water availability associated with the project would reduce the chronic exposure conditions of the riverbed and, in conjunction with the discontinuation of sluicing operations, provide a substrate better suited for development of stable aquatic communities.

A significant substrate modification associated with the site for Alternatives 2 or 3 would be the formation of a hard-surface, swift-water habitat along the proposed competitive channel. During scheduled water discharge periods, this substrate would provide a habitat resembling that formerly available to benthic organisms before the river water was diverted in 1943 for construction of the Ocoee No. 3 Dam. This habitat would limit aquatic species to those that could survive such temporary flow conditions. This improvement would be considered temporary during 1995 and 1996 after which the site would revert to limited habitat associated with restricted flow conditions.

C.11.c.2 Cumulative Effects

Cumulative effects on aquatic resources are described in Section C.11.a.2.

C.11.c.3 Mitigation Measures

Significant effects on aquatic invertebrates or fish communities were not identified at the proposed venue location; mitigation measures proposed are related to water quality control and are described in section C.10.a.3.

C.11.d Alternative 4

The no-action alternative assumes that the Olympic event would not be held on the Ocoee River, and therefore no facilities would be constructed and no modifications to the existing channel would occur. There would be no direct or indirect effects, no cumulative effects, and therefore mitigation measures are not proposed.

C.12 Wildlife Resources

This section summarizes the effects on wildlife expected to result from implementation of the proposed alternatives. An assessment matrix summarizing effects associated with four alternatives including no action, is provided in Table IV.C.12-1. The MIS approach was used to evaluate effects on wildlife.

The MIS concept is a process used to facilitate the evaluation of project or management actions on wildlife species with similar habitat requirements (Hunter, 1990). With this approach, one or more species are used as surrogates or indicators for other species that have similar habitat requirements. The effects are determined for the management indicator species and then extrapolated to the other species.

C.12.a Effects Common To Alternatives 1, 2, and 3

Some forest habitat would be lost with Alternatives 1, 2, and 3. The effects of the Alternatives 1, 2, and 3 on the MIS selected for evaluation would vary between early and late successional species and even within groups. The same is true of the remainder of the wildlife community that the MIS represent. The primary differences among the alternatives in relation to wildlife habitat are the amounts of habitat that would be lost due to construction activities and the acreages that would be allowed to revert to natural habitat.

C.12.a.1 Direct and Indirect Effects

The acreage of habitat lost or gained for any of the MIS or other of the 316 terrestrial or semi-terrestrial vertebrates that occur in the vicinity of the proposed venue is not significant in relation to overall populations of any of the species known to occur in the Ocoee River gorge. Populations of all species are sufficiently large and widespread that concern for them is minimal.

The upland forest community habitats in the immediate effect zone are not unique or uncommon, and wildlife species associated with them are abundant throughout eastern Tennessee, western North Carolina, and northern Georgia. Although mid- and older-aged stands are most abundant in the area,

stands representing all age classes occur throughout the Ocoee River gorge. Direct loss of habitat due to the proposed project (e.g., clearing areas for viewing stands, walkways, etc.), would be less than 13 acres under any of the alternatives, and thus environmental effects on the forest wildlife community from construction would be minimal.

Habitat suitability varies in quality from low to moderate for the MIS designated. Generally, species associated with mature forest ecosystems would not benefit from any of the alternatives because of loss of some middle-aged stands and the further delay in time to maturation. Other species likely to respond similarly to the pileated woodpecker include the southern flying squirrel, gray squirrel, other woodpeckers, and a variety of songbirds such as the Carolina chickadee, wood thrush, and Kentucky warbler. Species likely to respond similarly to the white-tailed deer include the gray fox and ruffed grouse.

Species likely to benefit to varying degrees from the alternatives, particularly Alternative 1, include the eastern cottontail, cotton rat, common yellowthroat, and indigo bunting.

C.12.a.2 Cumulative Effects

Alternatives 1, 2, and 3 would have no projected cumulative effects on wildlife in the vicinity of the site due to the short duration of the event.

C.12.a.3. Mitigation Measures

Effects on wildlife populations that occur in communities near the proposed Olympic Venue site are expected to be minimal because of adequate nearby suitable habitats. Therefore, mitigation measures are not proposed for wildlife.

C.12.b Alternative 1

Effects on MIS at the proposed venue location are discussed below. Timbering activities in the vicinity and the effects on MIS are summarized in the FLRMP. This plan contains a number of policies, management practices, standards and guidelines designed to benefit a variety of wildlife and fish species.

C.12.b.1 Direct and Indirect Effects

Habitat suitability for the bluebird would be enhanced once the proposed Olympic event ended and areas that had been cleared reverted to natural vegetation. The early successional areas would provide good foraging habitat, but their value would be short-lived. Tree and herb density would, in 3 to 5 years, make the areas again unsuitable for foraging.

TABLE IV.C.12-1
Wildlife and Habitat Assessment Matrix

Evaluation Criteria	Unit of Measurement	Alternatives			
		1	2	3	No Action
Riparian wildlife species habitat disturbed or destroyed	Acres	7.2	10.2	12.5	0
Upland wildlife species habitat destroyed or gained	Acres	0	0	0	0
<u>MIS Habitat Suitability</u>					
Bluebird		Temporarily Enhanced	Enhanced	Enhanced	No effect
American kestrel		Temporarily Enhanced	Slightly Enhanced	Slight decline	No effect
Chat		Enhanced	Slightly Enhanced	Slight decline	No effect
White-tailed deer		Remain stable	Slight Decline	Decline	No effect
Pileated woodpecker		Decline	Decline	Decline	No effect
Black bear		Remain stable	Decline	Decline	No effect

Habitat suitability for the American kestrel would be enhanced temporarily by the clearing associated with this alternative. Benefits would occur after the event when the facilities would be removed and the area would be allowed to return to native vegetation. The positive effects on the kestrel would be minor and short-lived. Within 3 to 5 years after the project, the site would again become unsuitable for this species.

Habitat suitability for the chat would not improve immediately as the species requires brush and thickets for cover. Conditions subsequently would improve however, and Alternative 1 would have a positive effect on the chat as cleared areas would revert to a brushy successional stage in 2 to 3 years following the proposed project. Habitat Table suitability would remain high for 10 to 15 years and then decline.

Habitat suitability for the white-tailed deer would likely remain stable under this alternative. Some areas would revert to early successional habitat favored by the species for browse production and cover, but an offsetting loss of food resources would occur as a result of the clearing of stands currently producing mast. Increased traffic during the construction period and the event could increase the number of deer killed on the road.

Habitat suitability for the pileated woodpecker would decline as a result of implementing this alternative. Loss of some moderate-quality habitat would occur as a result of clearing for construction of facilities and following the proposed project, the regeneration areas that would exist are of little value to this species. The net effect would be an immediate loss of habitat and lengthy period of time until optimum conditions (mature stands with large snags and fallen logs) redevelop.

Habitat suitability for the black bear would remain approximately the same following implementation of this alternative. Some loss of mast-producing hardwoods would occur as a result of clearing, and the time necessary for these stands to mature would be considerable. These losses would be offset by development of regeneration areas that would furnish both food (soft fruits and insects) and cover. Long-term effects to the black bear are expected to be minimal.

C.12.b.2 Cumulative Effects

Alternative 1 would have no cumulative effects on wildlife in the vicinity of the site.

As previously stated, environmental effects on wildlife populations would be similar for each alternative. Cumulative effects are discussed in Section C.12.a.2.

C12.b.3 Mitigation

Nesting habitat for the bluebird would be provided by the placement of bluebird boxes in appropriate areas.

C.12.c Alternative 2

Effects on MIS as result of implementation of Alternative 2 are as follows.

C.12.c.1 Direct and Indirect Effects

Once the proposed Olympic events end and areas that had been cleared revert to a natural state, habitat suitability for the bluebird would be enhanced. The amount of early successional habitat that would be available would be intermediate between Alternatives 1 and 3. As with Alternative 1, succession would eliminate habitat in regenerating areas within 3 to 5 years. Some permanent habitat would be maintained around facilities retained following the Olympics.

Habitat suitability for the kestrel would not increase as a result of clearing associated with construction of the proposed project. Because selected facilities are permanently maintained with this alternative, fewer areas would revert to an early successional state that would improve habitat quality. Some open habitat that would be suitable for foraging would be maintained around the facilities; however, unlike the bluebird, the kestrel is not tolerant of human presence, and it is unlikely that the species would use these open areas.

Habitat suitability for the chat would be enhanced slightly as some areas would be allowed to revert to early successional habitat. Because some facilities would remain following the proposed project, the amount of habitat that would be available for this species would be less than under Alternative 1.

Habitat suitability for the deer would decline slightly under this alternative. Portions of some stands currently producing mast would be lost and some areas would be allowed to regenerate following the proposed Olympics. There would be, however, a net loss in acreage of habitat suitable for deer. Continued human presence in the vicinity would also likely have a negative effect on the species, as deer would be subject to increased risk of being killed by vehicles.

Habitat suitability for the pileated woodpecker would decline under this alternative. Adverse effects would be intermediate between Alternatives 1 and 3.

Habitat suitability for the black bear would decline as a result of this alternative. Direct negative effects would be similar to those under

Alternative 3. Loss of habitat would occur during construction and would not be replaced following the proposed event. In addition, increased human presence in the area could have a negative effect on bears. In general, black bears avoid interaction with humans and areas that have a lot of activity (Wathen, 1993). Behavioral differences in black bears, however, can be expected in the vicinity of the venue site. Black bears in the sanctuary are more prone to allow some contact because they are not hunted. Other bears, however, are wilder and are less prone to interact with humans, and would avoid the venue site. An increase in traffic could increase the potential risk for black bears being struck and killed by vehicles.

C.12.c.2 Cumulative Effects

Alternative 2 would have no cumulative effects on wildlife in the vicinity of the site.

C.12.c.3 Mitigation Measures

Mitigation is addressed in Section C.12.a.3.

C.12.d Alternative 3 - Proposed Action

Effects to MIS resulting from Alternative 3 are discussed below.

C.12.d.1 Direct and Indirect Effects

Habitat suitability for the bluebird would be enhanced once the proposed Olympics ended and areas that had been cleared reverted to natural vegetation. Fewer acres would revert to early successional habitat than in Alternatives 1 and 2.

Habitat suitability for the kestrel would not increase as a result of clearing associated with construction of the proposed project. Because selected facilities are permanently maintained with this alternative, fewer areas would revert to an early successional state that would improve habitat quality. Some open habitat that would be suitable for foraging would be maintained around the facilities; however, unlike the bluebird, the kestrel is not tolerant of human presence, and it is unlikely that the species would use these open areas.

Habitat suitability for the chat would not be enhanced under this alternative because the permanent facilities preclude the development of the brushy conditions favored by the species. The amount of habitat that would be available for the chat would be less than under Alternative 2.

Habitat suitability for the white tailed deer would decline as a result of implementing this alternative. Mast production would be lost due to clearing for facilities, and would not be offset by development of regeneration areas following the proposed project. In addition, increased human presence in

the area would likely have a negative effect on deer using the remaining habitat. The potential risk of being killed by vehicles would increase.

Habitat suitability for the pileated woodpecker also would decline under this alternative. Currently suitable habitat would be lost and not replaced as facilities are permanent. Pileated woodpeckers are somewhat tolerant of human presence, and it is possible that some forest habitat maintained around the facilities would be used by the species.

Habitat suitability for black bear would decline as a result of this alternative. Loss of habitat would occur during construction and would not be replaced following the proposed event. The increase in human visitation to the Ocoee River Gorge would be expected to have the same adverse effects as discussed for Alternative 2.

C.12.d.2 Cumulative Effects

As previously stated, environmental effects on wildlife populations would be similar for each alternative. Cumulative effects are discussed in Section C.12.a.2.

C.12.d.3 Mitigation

Maintenance of open areas around buildings, trails, and parking areas could continue to provide some suitable foraging habitat for bluebirds. Provision of artificial nesting structures could further enhance habitat quality.

C.12.d.4 Alternative 4 - No Action

No disturbance to wildlife populations would be expected to result from Alternative 4. Cumulative effects would not occur, and mitigation measures would not be required.

C.13. Vegetation

Nine compartments have been identified in the region of the proposed Olympic Venue. Field surveys (1993) were conducted to identify characteristics of vegetative communities within each compartment. The following is a discussion of the potential environmental effects on those compartments which would be exposed to venue construction and operation. Effects on vegetation associated with the alternatives are summarized in Table IV.C.12-1.

C.13.a. Effects Common To Alternatives 1, 2, and 3

Effects of Alternatives 1, 2, and 3 on resources within vegetative compartments would be the same for each alternative, and therefore are grouped together in the following discussion. The impacts to plant communities are estimated based on acreages provided in the Design Report (USDA, 1993). A maximum range of approximately 7 to 13 acres

could potentially be disturbed or destroyed during construction and reconditioning.

C.13.a.1. Direct and Indirect Effects

Direct and indirect effects relating to development of the proposed Olympic Venue would affect Compartments 320, 330, and 364. In Compartment 320, activities associated with the proposed Olympic event would likely result in the destruction of portions of stand 1; direct effects on stands 2 and 3 would likely be minimal. There would likely be a significant increase in foot traffic on the Old Copper Road through both stands 1 and 2, but this would have little effect on the forest community itself. The primary concern in stands 1 and 2, as well as in stands further upstream, would be for sensitive wetland vegetation growing in seepage areas on or adjacent to the Old Copper Road. Effects on wetlands are discussed in detail in Section IV.C.15.

Aspects of Alternatives 1, 2, and 3 that would affect Compartment 330 include the construction of facilities for athletes and judges in a portion of stand 11. Thus, some direct loss of forest habitat is anticipated from the proposed project. Direct effects on stand 9 would not be insignificant. There potentially could be an increase in human activity in the stand, as its location overlooking the Ocoee River represents an excellent viewing area.

Stands 11 and 29 would likely be the only stands in Compartment 364 that would be directly affected by the proposed Olympic event. Effects on these stands would likely be similar in nature to those discussed above for stands 11 and 9 in Compartment 330.

C.13.a.2. Cumulative Effects

No cumulative effects on vegetative communities would result from implementation of Alternatives 1, 2, or 3.

C.13.a.3. Mitigation

Some habitat destruction and clearing of vegetation would be unavoidable during construction phases of the proposed action alternatives. Effects associated with land clearing activities should be minimized, and the areas directly affected should be restored by replanting after the construction phases are completed. It is recommended that native species be planted to replace vegetation cleared, to blend with the surroundings.

C.13.b. Alternative 4 - No Action

No disturbance of vegetative communities would result from this alternative. Cumulative effects would not occur, and mitigation measures would not be required.

C.14. TES Species

Effects on TES species were analyzed based on habitat requirements, range requirements, and location. This section reviews the effects associated with proposed venue development. An assessment matrix for TES species is provided in Table IV.C.14-1.

C.14.a. Effects Common To Alternatives 1, 2, and 3

Effects of Alternatives 1, 2, and 3 on TES species would be the same. Development of these alternatives would therefore result in similar effects. The common effects are discussed in the sections that follow.

C.14.a.1. Direct and Indirect Effects

Vegetation

Potential threats to TES plants resulting from the proposed Olympic event consist of direct destruction of plant populations and/or habitat modification caused by construction activity, altered flow regimes, increased visitation (e.g., trampling or plant removal), and changes in water quality.

Water quality has been degraded in the Ocoee River for many years because of surrounding land use practices. Changes in water quality conditions associated with the proposed Olympic event are considered minor and would not be likely to influence any of the TES species.

Site construction threats are considered only for the single species that occurs in the immediate effect zone (i.e., horse sugar). Populations of southern lobelia and pink lady slipper occur within 0.5 mile of the proposed Olympic site, but are located in areas not proposed for construction activity. Both the southern lobelia and pink lady slipper should be protected by marking their locations and avoiding them if possible. If avoidance is not possible, the lobelia should be transplanted; transplanting the lady slipper would not be successful (see also Section C.14.a.3 Mitigation).

Flooding threats are considered only for populations of TES species (southern lobelia, pink lady slipper and horse sugar) that occur between Ocoee No. 2 Dam and Ocoee No. 3 Dam since Ocoee No. 2 Dam diverts flow away from the stream bed into a tunnel and the No. 3 Dam provides a physical barrier to any potential backwater effects that could be associated with channel construction.

Direct human effects (e.g., trampling or plant removal) and/or habitat alteration associated with increased visitation are the primary threats to most populations of TES plant species in the Ocoee River gorge. These effects would probably be negligible

TABLE IV.C.14-1

Threatened, Endangered, and Sensitive Species and Critical Habitat Assessment Matrix

Evaluation Criteria	Unit	Alternative 1	Alternative 2	Alternative 3	No Action
Federally-listed threatened and endangered plant species adversely affected	Number	0	0	0	0
Candidate federally-listed threatened and endangered plant species adversely affected	Number	0	0	0	0
Sensitive plant species adversely affected	Number	3 ^a	3 ^a	3 ^a	0
Federally-listed threatened and endangered animal species adversely affected	Number	0	0	0	0
Candidate federally-listed threatened and endangered animal species adversely affected	Number	0	0	0	0
Sensitive animal species adversely affected	Number	0	0	0	0
Sensitive species habitat destroyed	Acres	<0.1 ^b	<0.1 ^b	<0.1 ^b	0
Sensitive habitat altered	Acres	<0.1 ^c	<0.1 ^c	<0.1 ^c	0

^a Pink lady slipper, southern lobelia, and horse sugar.

^b A small stand (2-5 shrubs) of horse sugar would be destroyed during project development.

^c Includes 3 small seepage wetlands along Old Copper Road in which southern lobelia grows and would be threatened by trampling or modification.

for most populations during construction phases of the project and during the Olympic event itself, but many populations are likely to be affected in the long run by increases in visitation to the Ocoee gorge due to increased popularity of the area. Potential threats to each of the TES plant species occurring in the Ocoee River gorge are discussed in the following narrative. The rationale for the assessment of effects on each of these species also is included.

Ruth's Golden Aster. All known populations of Ruth's golden aster occur downstream from Ocoee No. 2 Dam, and, consequently, no populations of the species are threatened by site construction activity or increased flow associated with the proposed event. All affected agencies (Forest Service, TVA, TDEC and USFWS) are currently monitoring the status of Ruth's golden aster. Increased visitation to the Ocoee River gorge is projected, and has the potential to increase pressure on this species through trampling and picking. The Biological Assessment and Biological Evaluation (Appendix I) provides additional information and potential mitigation measures concerning Ruth's golden aster. All agencies would act in close consultation with the USFWS to coordinate monitoring or implementation of protective measures for this species as necessary.

Nevius's Stonecrop. Nevius's stonecrop would not be affected by altered water regime, change in water quality, or direct destruction associated with construction of the proposed Olympic facilities because both existing populations of the species occur several miles downstream from the Olympic site on bluffs well above the high-water mark. This species is not likely to be trampled because it occurs on the sides of steep bluffs that are not easily climbed. However, several plants could be trampled in one location due to climbers trying to get a better view of the river. It is a small, inconspicuous plant that is not easily located, and it should not be threatened by picking.

Fraser Loosetrife. Fraser loosetrife would not be affected by altered water regime, change in water quality, or direct effects associated with construction of the proposed facilities because both existing populations occur downstream from Ocoee No. 2 Dam on flats above the normal high water mark. These areas are less likely to be used by visitors than boulders and other areas with an open view of the river.

Chalk Maple. Chalk maple would not be affected by altered water regime, change in water quality, or direct effects associated with construction of proposed facilities because all existing populations occur downstream from Ocoee No. 2 Dam on flats above the normal high water mark. Trampling and inadvertent destruction is less likely to be a severe threat for this species than other TES plants because of its inherent hardness and because the species occurs primarily in woodland areas not likely to have significantly increased visitation. One population of chalk maple could be affected by people climbing in the area where it is located to get a better view of the river.

Pink Lady Slipper or Moccasin Flower. The population of pink lady slipper that occurs near the proposed project site would not be affected by construction activity. The population would be threatened by prolonged flooding associated with the proposed event because it occurs within the flood hazard zone (Fig. III.A-10-3). Trampling or picking also poses a threat because the population occurs near enough to the proposed site that it is likely to be encountered by visitors. Pink lady slippers are not readily noticed except when they are flowering (April through July) and are thereby provided some protection from direct human effects. Pink lady slipper does not transplant easily (Summers, 1981), and protection and avoidance of individual plants are the only methods to ensure the continued survival of this population. The pink lady slipper should be protected by marking their location and avoiding them if possible (see also Section C.14.a.3 Mitigation).

The two populations of pink lady slipper that occur downstream from proposed Olympic site would be less likely to be negatively affected. Neither population would be affected by altered water regime, change in water quality, or direct destruction associated with construction of activities because both occur downstream from Ocoee No. 2 Dam on flats above the high-water mark. Trampling and picking during the proposed event should be less severe in these populations than in the other because fewer people would visit the sites. The pink lady slipper is often sought by plant fanciers, and the long-term survival of the species in the Ocoee River gorge would be threatened by increased visitation.

Bush Honeysuckle. Bush honeysuckle would not be affected by altered water regime, change in water quality, or direct destruction associated with construction of activities because both existing

populations of the species occur downstream from Ocoee No. 2 Dam, above the normal high-water mark. Trampling and inadvertent destruction are less likely to be severe threats for bush honeysuckle than other TES plants in the Ocoee River gorge because the species occurs primarily in woodland areas not likely to have significantly increased visitation, and because it is a small shrub, easily observed and avoided.

Southern Lobelia. The two populations of southern lobelia that occur near the proposed Olympic site would not be affected by prolonged flooding, changes in water quality, or direct destruction associated with construction activities because both occur outside the construction area and at elevations high enough that they would not be flooded at altered water levels. Primary threats to these populations would consist of trampling and habitat modifications (e.g., changes in wetland drainage patterns) associated with foot traffic in the fragile wetland habitats in which they occur. These populations occur along the Old Copper Road, a popular hiking trail that would likely be used during the proposed Olympic event.

Prolonged flooding, changes in water quality, and direct effects associated with construction activities are not considered threats to the populations of southern lobelia that occur downstream from Ocoee No. 2 Dam. Although these populations are less likely to be affected by trampling or habitat modification than the populations near the proposed Olympic site, the species is relatively small, fragile, and normally occurs in shallow wetlands that are easily altered.

Carey Saxifrage. Carey saxifrage would not be affected by altered water regime, water pollution, or direct destruction associated with construction activities because both existing populations occur several miles downstream from the proposed Olympic site on bluffs above the normal high water mark. This species is not likely to be affected by trampling because it occurs on steep bluffs that are not easily climbed.

Horse Sugar or Sweetleaf. A single population of horse sugar occurs in an area in which construction activity is proposed. Unless this population is protected or incorporated into design plans, it would likely be destroyed. (See Biological Evaluation, Appendix I).

Other populations of horse sugar in the Ocoee River gorge would not be affected by altered water

regime, changes in water quality, or direct destruction associated with construction activities because they occur in isolated locations that are not in the flood hazard zone (Figure III.A.10-3). Trampling and inadvertent destruction are unlikely to be severe threats to horse sugar because the species occurs primarily in woodland areas not likely to have significantly increased visitation, and because it is a small shrub, easily observed and avoided. The continued existence of horse sugar in the Ocoee River gorge is relatively secure because it is widespread, hardy, and has a growth form that can withstand trampling and removal of vegetative tissue. Horse sugar is a nondescript shrub, and it would not be noticed by most visitors to the gorge.

Southern Nodding Trillium. The only known population of the southern nodding trillium in the vicinity was located downstream of Ocoee No. 2 Dam. Consequently, the species would not be affected by flooding or construction activities related to the proposed Olympic event.

Wildlife

Potential threats to TES wildlife species resulting from the proposed Olympic event consist of direct destruction of individuals and habitat modification caused by construction activity. Unlike plants, most animals are highly mobile and secretive. Consequently, the degree of certainty that a TES animal species is or is not present at the proposed project site is less than that for TES plant species. Potential threats to each of the TES animal species that have been reported from the Ocoee River gorge, as well as a discussion of TES species that have been reported from Polk County, but have a low probability of occurring at the proposed Olympic site are described below.

Red-Cockaded Woodpecker. The only known RCW colony (based on a sighting of an individual male) in the vicinity is almost 10 miles away, and would not be adversely affected by the proposed activity. The lone male at the site has been, and continues to be, monitored by Forest Service biologists.

Grasshopper Sparrow. The habitat at the proposed Olympic site is not suitable for grasshopper sparrows, and they have not been reported from the Ocoee River gorge. Consequently, the proposed Olympic event should not adversely affect the species.

Osprey. Ospreys have been reported from Polk County (TDEC, 1992), and individuals are

known to occur, at least occasionally, on nearby reservoirs that support adequate fish populations. Some individuals may occasionally fly through the gorge, but the scarcity of a prey base in the Ocoee River (See Aquatic Resources, Section IV.C.11) makes the area unsuitable for long-term residence. Ospreys are relatively tolerant of human activity, and would not be affected by the proposed Olympic event.

Bald Eagle. Bald eagles have been reported from Polk County (TDEC, 1992), and individuals occur at least occasionally on nearby reservoirs that support adequate fish populations. Some individuals may occasionally fly through the gorge, but the scarcity of a prey base in the Ocoee River (See Aquatic Resources Section IV.C.11) makes the area unsuitable for long-term residence (Hatcher, 1992). Although a single eagle currently winters on Lake Ocoee, it should not be present during the proposed Olympic event. Bald eagles should not be adversely affected by the proposed Olympic event.

Green Anole. Green anoles probably occur at the proposed Olympic site, and it is possible that a few individuals would be inadvertently killed or their eggs destroyed by construction activities. However, they are small and agile, and most individuals should be able to escape unharmed. Anoles are extremely tolerant of humans, and they often use buildings and fences as part of their habitat. Green anoles should not be negatively affected by the proposed Olympic event, and some habitat modification (e.g., building construction) may be beneficial to the species.

Six-lined Racerunner. Although six-lined racerunners have been reported historically from the Ocoee River gorge, no recent records have been documented, and the habitat in the vicinity of the proposed Olympic event is not optimal for the species. The species probably does not occur in the immediate vicinity, and if it does, the population is probably small. Consequently, negative effects from the proposed activity are not expected.

Northern Pine Snake. The northern pine snake has not been reported from the Ocoee River gorge, but it is a secretive species, and it is not frequently observed, even where it is known to occur. A few individuals may be present in the proposed project site, but they are not likely to be encountered. Optimal pine snake habitat is not present at the proposed Olympic site, and similar habitats exist nearby; thus, few individuals are likely to occur in

the area. Consequently, the northern pine snake is not likely to be adversely affected by the proposed Olympic event.

Water Shrew, Star-Nosed Mole, New England Cottontail, and Carolina Northern Flying Squirrel. Water shrews, star-nosed moles, New England cottontails, and Carolina northern flying squirrels have been reported from Polk County (TDEC, 1992). However, all of these are northern species that occur in Tennessee only at higher elevations (usually above 3,000 feet MSL.) (Kennedy and Harvey, 1980). None have been reported from the Ocoee River gorge, and they probably do not occur at the proposed Olympic site. Consequently, none of these species are likely to be adversely affected by the proposed event.

Hairy-Tailed Mole. The hairy-tailed mole has not been reported from the Ocoee River gorge, and habitats in which it occurs in Tennessee are different from those at the proposed Olympic site. Consequently, the probability that this species occurs there is very low, and it should not be adversely affected by the proposed Olympic event.

Rafinesque's Big-Eared Bat. Although the Ocoee River gorge is within the range of Rafinesque's big-eared bat, this species has never been reported there. It probably does not occur at the proposed Olympic site because of lack of adequate roosting sites (i.e., abandoned buildings or caves) and general scarcity of suitable habitat. Consequently, the proposed Olympic event would not adversely affect the species.

Least Weasel. The least weasel has been reported from Polk County (TWRA, 1993), but it is primarily a northern species that occurs in Tennessee mostly at high elevations (usually above 3,000 feet MSL.) (Kennedy and Harvey, 1980). No least weasels have been reported from the Ocoee River gorge, and the habitat at the proposed Olympic site does not appear suitable for them. Consequently, the species is not likely to be adversely affected by the proposed event.

Tennessee Dace. The Tennessee dace occurs in tributaries to the Ocoee River several miles downstream from the proposed project site. It does not occur in the main channel of the Ocoee River, and it is not likely to be affected by the proposed Olympic event.

Ocoee Covert Snail. The Ocoee covert snail occurs along steep banks of small tributaries of the

Ocoee River, but it does not occur within the floodplain of the main channel of the river. The snail's habitat is not likely to be affected by the proposed Olympic event, and therefore the event should not adversely affect either of the two known populations of the species.

Snail Darter. The snail darter was reported from downstream of Parksville*, Lake, outside the ROI of the Olympic event. This species would therefore not be adversely affected.

C.14.a.3. Mitigation

The population of horse sugar or sweetleaf that occurs at the proposed Olympic site would be directly effected by Alternatives 1, 2 and/or 3. This population should be flagged and avoided during construction activities and incorporated into the landscape design where possible. If this is not feasible, attempts to move individual shrubs to the margin of the site should be made. However, transplanting may prove unsuccessful because the shrubs are moderately large, and they occur in rocky habitat in which damage to root systems would be likely during transporting. The presence of this plant could be used for interpretive interest for visitors.

The population of pink lady slipper that occurs near the proposed Olympic site should also be flagged and avoided during construction activities. Moving this population would not be feasible because the species is extremely difficult to transplant successfully.

Populations of southern lobelia that occur along the Old Copper Road should be flagged and avoided during construction activities. Small walkways should be built to reduce foot traffic through the small seepage wetlands along the Old Copper Road where the species occurs.

Chalk maple and Nevius' stonecrop, although located outside of the venue site, could be affected by people climbing in areas where they are located to get a view of the river. In order to protect these species the area in the vicinity of these species should be fenced off from the public during the events.

Efforts that encourage people to use locations in the Ocoee River gorge where TES plants do not occur is the best approach to ensure continued survival of all TES species in the vicinity. Signs designating the gorge as a sensitive botanical area would be erected at key points along Highway 64, outside the site. This measure would heighten the public's

awareness of the sensitivity of the gorge. Ruth's golden aster would continue to be monitored by agency biologists. Additional information and potential mitigation measures are included in the Biological Assessment and Biological Evaluation in Appendix I.

Effects on TES wildlife species are not expected, and mitigation measures are not proposed.

C.14.b. Alternative 4 - No Action

The no-action alternative would result in the Ocoee River not being used for the Olympic Venue, and therefore there would be no direct effects on TES species from this alternative. Normal increases in visitation could result in some stress on TES species above present levels. No cumulative effects are anticipated from this alternative; no mitigation measures are proposed.

C.15. Wetlands

The discussion below summarizes effects of development of the Olympic Venue on wetlands. An assessment matrix that summarizes wetland effects is provided in Table IV.C.15-1.

C.15.a. Effects Common To Alternatives 1, 2, and 3

Development of the Olympic Venue under Alternatives 1, 2, and 3 would have similar effects on wetlands, and are addressed together in this section.

C.15.a.1. Direct and Indirect Effects

It is unlikely that wetlands located 2 miles to the east of the proposed site (NWI mapped) would be affected by the project because construction activity is not planned for the area, and they are not hydrologically linked to the portion of the Ocoee River that would be affected by the proposed Olympic event.

Minor direct effects on wetlands caused by construction activity would be likely to occur at a few locations in the immediate effect zone. These wetlands consist of sites within the Ocoee River channel, three to five small tributaries that flow into the river near the proposed site, and some of the small emergent wetlands located along the Old Copper Road. Most wetlands in the Ocoee River gorge do not occur at sites where construction activity is proposed, and this threat is minimal to the majority of wetlands. Approximately one acre would be affected, and less than one acre would be filled or hydrologically modified (Table IV.C.15.1).

**TABLE IV.C.15-1
Wetlands Assessment Matrix**

Evaluation Criteria	Unit of Measurement	Alternatives			
		1	2	3	4
Palustrine wetlands lost	Acres	0	0	0	0
Palustrine wetlands disturbed or altered, but not filled	Number	9 ^a	9 ^a	9 ^a	0
	Acres	0.4	0.4	0.4	0
Riverine wetlands lost	Number	2 ^b	2 ^b	2 ^b	0
	Acres	0.6	0.6	0.6	0

^a Includes 9 small seepage wetlands that would not be affected directly by Olympic Venue development, but are likely to be affected indirectly by foot traffic along the Old Copper Road.

^b 148 yd. x 18 yd. wetland in the river channel immediately downstream from the course that would be threatened by construction activity and/or hydrological modifications.

Indirect effects to wetlands could occur upstream of the proposed project site along the Old Copper Road. These wetlands could be affected by foot traffic associated with increased visitation to the site. These wetlands are not likely to be destroyed by this activity, but modification of hydrological regimes and plant communities are likely.

C.15.a.2. Cumulative Effects

Cumulative effects on wetland resources identified are not anticipated.

C.15.a.3 Mitigation Measures

Wetlands associated with tributaries flowing into the Ocoee River and small seepage wetlands located along the Old Copper Road should be avoided where possible, or incorporated into the final design plan. Wetland issues would be addressed during permit consultation with the Army Corps of Engineers in accordance with Section 404 of the U.S. Clean Water Act of 1977 (as amended).

C.15.c. Alternative 4 - No Action

No additional disturbance to wetlands would result from Alternative 4. Cumulative effects are not anticipated and mitigation measures would not be required for this alternative.

C.16. Cultural Resources

One site considered eligible for the National Register of Historic Places is located within the Olympic Venue ROI: 40PK373-A, a section of the Old Copper Road. An assessment matrix for cultural resources is presented in Table IV.C.16-1.

C.16.a. Effects Common To Alternatives 1, 2, and 3

Construction of bridge abutments and Ocoee River 1, 2, and 3 channel construction would directly adversely effect the Old Copper Road under Alternatives 1, 2, and 3.

C.16.a.1. Direct and Indirect Effects

Table IV.C.16.1 shows that only one site would be adversely affected by Alternatives 1, 2, and 3 and by the No Action Alternative. This site is a segment of the Old Copper Road which is proximate to the Olympic venue site. The Old Copper Road would be adversely affected as a result of construction vehicles moving onto and away from the site during venue construction and reconditioning.

While these effects may be less intensive in some locations, the entire length of the Old Copper Road proximate to the Olympic Venue would be effected to some extent. The length of the road segment affected was calculated to be 3,800 feet. Indirect adverse effects on the Old Copper Road

would occur due to foot traffic associated with increased visitation as the Ocoee River gains popularity as a recreational resource. This would result in accelerated erosion, possible graffiti, litter, and a concomitant degradation of the resource.

C.16.a.2. Cumulative Effects

There would be no anticipated cumulative effects to cultural resources in the vicinity of the Olympic venue site.

C.16.a.3. Mitigation Measures

Pursuant to Sections 106 and 110 of the National Historic Preservation Act (NHPA) 36 CFR Part 800; (see Appendix H), the Forest Service is required to consult with the Tennessee SHPO and the ACHP when NRHP sites are to be affected by ground-disturbing activities. It has been determined that the implementation of Alternatives 1 through 3 would result in direct and indirect adverse effects on one identified NRHP-eligible property, 40PK373-A, the Old Copper Road. In conformance with Section 110 of the NHPA, when adverse effects on NRHP sites cannot be avoided, the Forest Service is required, in consultation with the Tennessee SHPO and the ACHP, to formulate mitigation measures to minimize adverse effects, and to protect and enhance the affected property. In conformance with Section 110 of the NHPA, these measures will be stipulated in a MOA (see Appendix G-9) in which the Tennessee SHPO, ACHP and the Forest Service mutually agree. As a minimum, the MOA would include the following stipulations for management of the Old Copper Road:

- When prudent and feasible, the Forest Service will rehabilitate and adaptively reuse the portion of the Old Copper Road affected by construction, as per the Secretary of Interior Standards and Guidelines for rehabilitating Historic Buildings (U.S. Department of Interior, National Park Service 1983).
- The Forest Service would develop a Historic Preservation Plan (HPP) for the Old Copper Road. The HPP would include, at a minimum, the following:
 - Methods to prevent degradation to the property,
 - Methods of interpreting the significance of the property, and
 - Program for monitoring the property (for maintenance purposes).
- The Forest Service would fully document/record the Old Copper Road. This would include, but not be limited to, the following:

TABLE IV.C.16-1
Archeological Sites Assessment Matrix

Evaluation Criteria	Unit of Measurement	<u>Alternative</u>			
		1	2	3	No Action
Cultural Resource Sites	Number	4	4	4	4
	No Effect	3	3	3	3
	No Adverse Effect	0	0	0	0
	Adverse Effect	1	1 ^a	1 ^a	1

^a This is an indirect effect caused by increased public use of site.

- Topographic mapping of the property,
 - Recording of construction techniques and associated features, and
 - Photographic documentation.
- The Forest Service would conduct a complete survey of areas to be affected by Alternatives 1, 2, and 3.
 - The Forest Service would evaluate all properties identified during the survey.
 - The Forest Service would limit access which would adversely affect the Old Copper Road.
 - The Forest Service would monitor any demolition of the Old Copper Road during construction of the venue.

C.16.b. Alternative 1

Effects associated with Alternative 1 would result from construction vehicles during development of venue facilities.

C.16.b.1. Direct and Indirect Effects

This alternative appears to represent the greatest effect on the segment of the Old Copper Road that intersects the proposed venue site, as it would require greater heavy equipment passage over the road (for construction and removal), as well as more substantial filling within the whitewater course, than Alternatives 2 or 3.

C.16.b.2. Cumulative Effects

There would be no cumulative effects on the Old Copper Road associated with Alternative 1.

C.16.b.3. Mitigation Measures

Mitigation measures would be the same as those common to Alternatives 1, 2, and 3.

C.16.c. Alternative 2 and Alternative 3 - Proposed Action

The discussion of Alternatives 2 and 3 effects is combined in this section because the cultural resource effects are similar.

C.16.c.1. Direct and Indirect Effects

Construction and grading activities associated with installation of platforms are the principal activities that would result in effects on the Old Copper Road from implementation of Alternatives 2 or 3.

Alternatives 2 and 3, which call for mixed temporary and permanent construction and for mostly permanent construction, respectively, would have limited direct effects on the Old Copper Road,

and varying indirect effects. Alternatives 2 and 3, which would result in considerable public use of the Olympic Venue site after the Olympics, would likely lead to further deterioration of the Old Copper Road from its secondary use as a hiking trail/public facility. This problem would be addressed in an HPP for the Old Copper Road, which would be ratified in an MOA among the Forest Service, the Tennessee SHPO, and the ACHP.

C.16.c.2. Cumulative Effects

There would be no cumulative effects associated with implementation of Alternatives 2 or 3.

C.16.c.3. Mitigation Measures

The mitigation measures for Alternatives 2 and 3 would be the same as those common to Alternatives 1, 2, and 3.

C.16.d. Alternative 4 - No Action

The conditions of the Old Copper Road would likely remain as currently exist under Alternative 4. The Old Copper Road would remain as described in Chapter III.A.16. This would result in no effect to the property and no mitigation measures would be required.

C.17. Facilities Engineering

Facilities engineering aspects of developing the Olympic Venue include the analysis of construction of the competitive channel, support facilities, and local infrastructure improvements. For the purposes of this analysis, the construction requirements of the venue have been divided into two general categories to evaluate the potential effects of Alternatives 1, 2, and 3. The first category is pre-Olympic construction activities required to provide the facilities to support the venue. Second is post-Olympic activities which include the construction, demolition and restoration activities that would be required to leave the venue site in a condition to provide the ultimate end use opportunities that would be available after the Olympic event.

Pre-Olympic activities would include land disturbing operations such as clearing, excavation, grading, filling, and paving various areas of the site for venue structures, haul roads, and support operations. Post-Olympic activities would include demolition, removal, filling, regrading, and spoil-disposal operations required to transform various areas of the site into their ultimate end use conditions.

The primary source of data for evaluating facilities engineering effects is the itemized quantity list presented in the cost estimate section of the Design Report (USDA, 1993). Descriptions of the venue facilities, operations and construction materials provided in the narrative of the Design Report

were also used to define the limits of the proposed construction effects. Data for the Design Report serves as the basis for the discussion of alternatives presented in the following text. An assessment matrix for facilities engineering is provided in Table IV.C.17-1.

C.17.a. Effects Common to Alternatives 1, 2, and 3

Olympic construction requirements for all three action alternatives for water, wastewater and power facilities would be similar. Construction effects would include the installation of access roads and trenched piping and/or conduit runs to connect the utility facilities and the service areas.

C.17.a.1. Direct and Indirect Effects

Infrastructure installation would involve clearing of roads and utility rights of way to facilitate installation of water, sewage, power, and communication lines. Activities associated with these operations would include clearing and grubbing, trenching, and backfilling.

For Alternative 1, the roads and areas cleared for utility facilities would be restored to their original condition and seeded, with buried structures and trenched lines to be abandoned in place. For Alternatives 2 and 3 some portion of the system would remain; however, the effects of construction are not expected to be significant.

C.17.a.2. Cumulative Effects

Cumulative effects resulting from these activities could include temporary disruption of U.S. Highway 64 traffic to accommodate movement to and from the site of construction vehicles and heavy equipment.

C.17.a.3. Mitigation Measures

The implementation of best construction management practices to preclude erosion and sedimentation and the scheduling of construction traffic on U.S. Highway 64 would minimize environmental effects associated with infrastructure installation and removal or reconditioning.

C.17.b. Alternative 1

Effects on facilities engineering aspects of Alternative 1 are discussed below.

C.17.b.1. Direct and Indirect Effects

The pre-Olympic development of the competitive channel would be the most significant construction effect of Alternative 1. The temporary construction proposed would require 60,800 tons of stone fill to create the whitewater slalom course. Additional earthwork activities would include

minimal grading, topsoil placement, and retaining wall construction within the limits of the existing river bed during the construction of the competitive channel.

The clearing and grading acreage requirements for this alternative would generate the least effect of Alternatives 1, 2, and 3. The majority of facilities development would occur on the right bank between U.S. Highway 64 and the river, and within the limits of the proposed competitive channel located in the existing river bed. Minimal effect on existing land on the left bank is envisioned, as development only of facilities for broadcasting and management offices would be located on fill placed between the limits of the existing river bed and the proposed competitive channel.

The primary effect of constructing and removing the temporary bridges would be the placement and removal of the mid-span abutments and is expected to be similar but lesser in effect to the placement of stone and fill activities performed during the construction and reconditioning of the channel.

Because of the requirement to remove all facilities after the Olympic Games, Alternative 1 would require the largest level of effort for post-Olympic construction activities. The construction of the competitive channel within the existing river bed would be limited to providing the minimum supporting structure required to define the whitewater course, thus resulting in a relatively smaller total volume of fill placement compared to the other alternatives. However, the total volume of spoil to be removed for disposal remains substantial, exceeding 72,000 cubic yards. Identification of acceptable sites for the ultimate disposal of this material offsite would be a major concern of post-Olympic activities and would be identified in final design plans.

The effects of removing the proposed temporary facilities, including tents and trailers used for shelters and offices, scaffolding, and wooden deck platforms used for seating and pedestrian use, and gravel for pavement surfacing, are expected to be minimal.

C.17.b.2 Cumulative Effects

The cumulative effects associated with facilities engineering aspects of implementing Alternative 1 would be similar to those common to Alternatives 1, 2, and 3.

C.17.b.3 Mitigation Measures

In addition to the mitigation measures proposed as common to Alternatives 1, 2, and 3, the following activities would further minimize effects associated with Alternative 1.

TABLE IV.C.17-1
Facilities Engineering Assessment Effects

Evaluation Criteria	Units	Alternatives			
		1	2	3	4
Clearing	Acres	7.2	10.2	12.5	0
Grading ^a	CY	3,550	13,926	11,730	0
Earth Fill	CY	4,050	9,124	8,474	0
Stone Fill - Channel Construction	Tons	60,800	95,900	95,900	0
Stone Fill - General Construction	Tons	0	23,000	53,400	0
Retaining Walls	LF	1,200	5,680	3,700	0
Stone Paving	SF	81,000	84,500	83,400	0
Asphalt Paving	SF	0	24,850	71,944	0
Temporary Facilities	SF	201,040	192,140	192,640	0
Permanent Facilities	SF	0	13,920	16,740	0
Spoil Disposal ^b	CY	72,100	9,700	0	0

a These quantities include grading associated with excavation and moving of fill brought onto the site (USDA, 1993).

b Post-Olympic removal of channel and facilities (USDA, 1993).

The most significant potential effect of construction activities during both the pre- and post-Olympic periods is the transport of sediment and debris from the construction/venue site as a result of land disturbing activities. For Alternative 1, the construction and removal of the competitive channel would be the activity that has the highest potential to release sediment and debris downstream from the site. All construction and spoil materials removed from the site would be disposed of in an approved manner and location, with the least possible damage to the environment. Special precautions would be required to handle any pyritic rock disturbed during construction phases (see also Section IV.C.9, Geology and Soils).

To address the concerns of sediment transport, special care and attention would be given to the placement and installation of sediment traps intercepter dikes, filter berms, and construction exits. Special provisions to accommodate the possibility of high water levels in the river bed during construction and demolition activities would also be considered. Installation and proper maintenance of additional standard practices for sediment and erosion control, including controlled construction access, perimeter barriers, and proper dust control measures, would minimize the effect of the proposed construction. Additional erosion and sedimentation controls described in Section IV.C.10, Hydrology.

C.17.c. Alternative 2

Alternative 2 effects relating to facilities engineering are discussed in the following section.

C.17.c.1 Direct and Indirect Effects

The development of the competitive channel would be the most significant construction effect associated with Alternative 2. To accomplish the construction proposed, it has been estimated that almost 95,900 tons of stone fill of the 118,900 tons required for Alternative 2 development would be required to construct the permanent whitewater course. Additional earthwork activities, including excavation, grading, topsoil placement, and retaining wall construction, would also take place within the limits of the existing river bed during the construction of the competitive channel.

The clearing and grading requirements for this option would fall between those being proposed for Alternatives 1 and 3. Compared to Alternative 1, Alternative 2 proposes the development of the left bank land outside of the existing river bed. This is being proposed to allow the siting of the athletic service facilities which were located on the right bank, in Alternative 1. This facility is sited on relatively steep side slopes, and it has been estimated

that approximately 2 acres of clearing and 1,500 cubic yards of grading and filling would be required.

The remaining facilities occur on the right bank as proposed in Alternative 1. An additional 1 acre of clearing has been proposed on the right bank over that shown for Alternative 1, to allow additional development of the spectator services area and a provision for a permanent day use building.

Since the competitive channel would remain in place after the Olympic Games, the total volume of spoil to be disposed of is substantially less than what is required in Alternative 1. The total volume of spoil disposal estimated for Alternative 2 is 9,700 cubic yards. This volume is distributed between the left bank broadcast management facilities (4,700 cubic yards), the competitive channel (2,000 cubic yards), and right bank spectator-VIP entry facilities (3,000 cubic yards) respectively. As with Alternative 1, the installation and removal of tents and trailers for shelters and offices, and scaffolding and wooden deck platforms for seating and pedestrian use, for temporary facilities have been proposed to minimize the effect of facilities removal activities at the site.

C.17.c.2. Cumulative Effects

The cumulative effects associated with this alternative are the same as those common to Alternatives 1, 2, and 3.

C.17.c.3. Mitigation Measures

In addition to mitigation measures common to Alternatives 1, 2, and 3, the following measures are proposed for Alternative 2.

As with Alternative 1, the largest potential effect of construction activities during both the pre- and post-Olympic periods would be the transport of sediment and debris from the construction/venue site as a result of land disturbing activities. The clearing and grading operations proposed for Alternative 2 would require a conscious effort to install and maintain sediment and erosion control measures during construction/removal operations. The additional mitigation recommendations made for Alternative 1 also apply to Alternative 2.

C.17.d. Alternative 3 - Proposed Action

The effects upon facilities engineering associated with implementation of Alternative 3 - Proposed Action are discussed below.

C.17.d.1. Direct and Indirect Effects

The pre-Olympic development of the competitive channel would be similar to Alternative 2 and has been estimated to require 95,900 tons of stone fill to construct the permanent whitewater course.

In addition, earthwork activities including grading, topsoil placement, and retaining wall construction would also take place within the limits of the existing river bed during the construction of the competitive channel.

As with Alternative 2, Alternative 3 proposes the development of left banks land outside of the existing river bed to allow the siting of the athletic services facilities which were located on the right bank in Alternative 1.

Clearing has been proposed for the right bank that would be greater than that proposed in Alternative 2 to enhance the development of a permanent day use building site and permanent terraced spectator area.

Permanent upper and lower bridges are proposed to provide access to the left bank to support post-Olympic whitewater activities. Temporary effects would be associated with construction of these structures, and would include land clearing activities.

Because many facilities would remain after the Olympic Games, Alternative 3 would require minimal post-Olympic removal and demolition activities. As with Alternative 1, the use of tents and trailers for temporary shelters and offices and scaffolding and wooden deck platforms for seating and pedestrian use are proposed to minimize the effect of facilities removal activities at the site.

C.17.d.2. Cumulative Effects

The cumulative effects would be the same as those common to Alternatives 1, 2, and 3.

C.17.d.3. Mitigation Measures

The installation and proper maintenance of standard practices for sediment and erosion control referenced under mitigation measures for Alternatives 1 and 2, including controlled construction access, perimeter barriers, and proper dust control measures, would minimize the effect of the proposed construction.

C.17.e. Alternative 4 - No Action

Alternative 4 would involve no land-disturbing activities, and as a result has no relative environmental effect. Existing sediment transport and runoff patterns would remain. Additional developed public access and whitewater recreation opportunities would not be provided. Therefore, cumulative effects would not occur, and mitigation measures would not be required for this alternative.

D. REASONABLE FORESEEABLE DEVELOPMENT SCENARIO

Integral to the EIS is the development and analysis of the Reasonable Foreseeable Development Scenario (RFDS). The RFDS seeks to identify, by alternative, future use and condition of the site. Anticipated future use and condition of the site under Alternatives 1 and 4 would be a continuation of present dispersed recreation activities. This could also include limited canoe/kayak whitewater use during high flow conditions as is currently permitted.

D.1. RFDS Baseline Conditions

Baseline conditions for the RFDS under Alternatives 1 and 4 are very similar. There exists two possibilities for future use and site condition associated with these alternatives. Under Alternative 1 the site would be returned to post-Olympic event conditions (reconditioning has occurred), while under Alternative 4 the event would not have been held. Therefore, with the exception of socioeconomic conditions and recreational resources, effects on resource categories resulting from the RFDS would be directly related to an extension of baseline conditions. The following summarizes these consequences for resource categories that would be affected by the RFDS scenario:

- Air Quality - conditions could improve with implementation of requirements under the CAA, or possibly decrease if road improvement projects significantly increase traffic volumes.
- Traffic and Transportation - a nominal annual increase in traffic volumes is anticipated.
- Noise -there would be an incremental increase in noise levels commensurate with increased traffic volumes and visitation.
- Socioeconomics - a minor economic loss (employment and retail sales) could occur with the absence of future development.
- Public Facilities - absence of future development would have a positive effect on local infrastructure by not placing an additional burden on the existing systems.
- Recreation - a loss of recreational opportunities would result from the absence of future development.
- Hydrology - some improvements to water quality could be anticipated as conditions in the watershed improve.
- Aquatic Resources - improvements to water quality would improve conditions for aquatic

organisms; however, sediment conditions and restricted flow would minimize these improvements.

- Wildlife - normal visitation increases would have a minor effect on wildlife.
- Vegetation - normal visitation increases would result in some trampling of site vegetation.
- Threatened and Endangered Species - effects on TES would vary depending upon visitation levels.
- Wetlands - wetlands could be expanded or created by upstream beaver dam building activity.
- Cultural Resources - increased pedestrian use could have a negative effect unless resources are protected.
- Facilities - normal visitation increase could result in need for facilities such as port-o-lets.

The baseline conditions from which the RFDS is developed are projected conditions existing during the summer of 1996, during the Olympic events assuming the whitewater events are held on the Ocoee River under Alternatives 2 and 3 scenarios. In summary, the 1996 baseline conditions would equate to a period of peak utilization of the Ocoee River, a maximum number of visitors to the facility, increased economic activity throughout the ROI, increased traffic and congestion on U.S. Highway 64, and increased utilization of recreational facilities throughout the proposed venue locale.

D.2. RFDS for Alternatives 2 and 3

Figure IV.D.2-1 depicts the RFDS. The RFDS is similar for Alternatives 2 and 3. Both alternatives envision retention of all permanent facilities. These facilities include: the competitive channel, the upper bridge, parking areas, the day use building, and utilities. Additional facilities retained under the Alternative 3 RFDS include: timeshack facility, additional terracing for spectator seating, a new lower pedestrian bridge, and picnic facilities.

The RFDS envisions continued use of the Olympic Venue for whitewater recreation, with the number of days of water release likely to be limited to 26 to 39 per year at 1600 cfs. Evidence of additional demand for recreational days on the river and a successfully negotiated supplemental agreement between the TDEC, the Forest Service, and TVA for recreational releases could result in more days during which the Olympic Venue stretch of the river could be used for recreation. Flows at lower rates such as 1200 cfs may allow up to 100 days of scheduled release as currently exists on the lower Ocoee if recreational demand and cost recovery methods allow. While costs and benefits for future

use have not been addressed in detail due to uncertainties at the time of this analysis, it is anticipated that local benefits in terms of income, government revenues, and secondary effects from employment and population increases would exceed local costs to provide services.

Future uses of structures remaining after the Olympic events could include concessions, a Forest Service information center or other appropriate use, facilities for commercial outfitters, TVA administrative space, or caretaker housing. The number of competitive whitewater events held on the river would increase, as would the number of spectators for those events.

The result of limited water release days, coupled with forecasts for peak visitor days being lower than similar days during pre-Olympic and Olympic events, indicate that effects on several resource categories would be less than, or equivalent to effects previously noted in this chapter for Alternatives 2 and 3. These resource categories include air quality, noise, public facilities, geology and soils, aquatic resources, vegetation, and wildlife resources, cultural resources, and facilities. The following is a discussion of the remaining resource categories which would be affected by the RFDS for Alternatives 2 and 3.

D.2.a. Traffic and Transportation

Opening the upper Ocoee River to whitewater use would be expected to attract additional people to the area. With the anticipated widespread media coverage of the pre-Olympic and Olympic events, the area would likely become very popular. As previously stated, over 3,800 visitors could be attracted to the Olympic site and the vicinity of the upper Ocoee on a typical July weekend day in the year 2006. Even with background traffic increasing at a rate of 3 percent per year, LOS in the area would stay approximately the same (Figure IV.D.2-2).

D.2.b. Socioeconomics

The principal economic effect of the RFDS in the ROI would be due to increased use of the Ocoee River by rafters, kayakers, and canoeists. Table IV.D.2-1 presents a forecast of recreational use of the Ocoee River (upper and lower stretches) from 1996 through 2006. The projections are based on the upper stretch being open for commercial rafting 26 days per year, and the lower stretch being open 114 days per year. Should the upper stretch be open for commercial rafting more than 26 days, the economic benefits would be greater within the ROI.

In 2006, paying and nonpaying utilization of the upper and lower stretches could range from

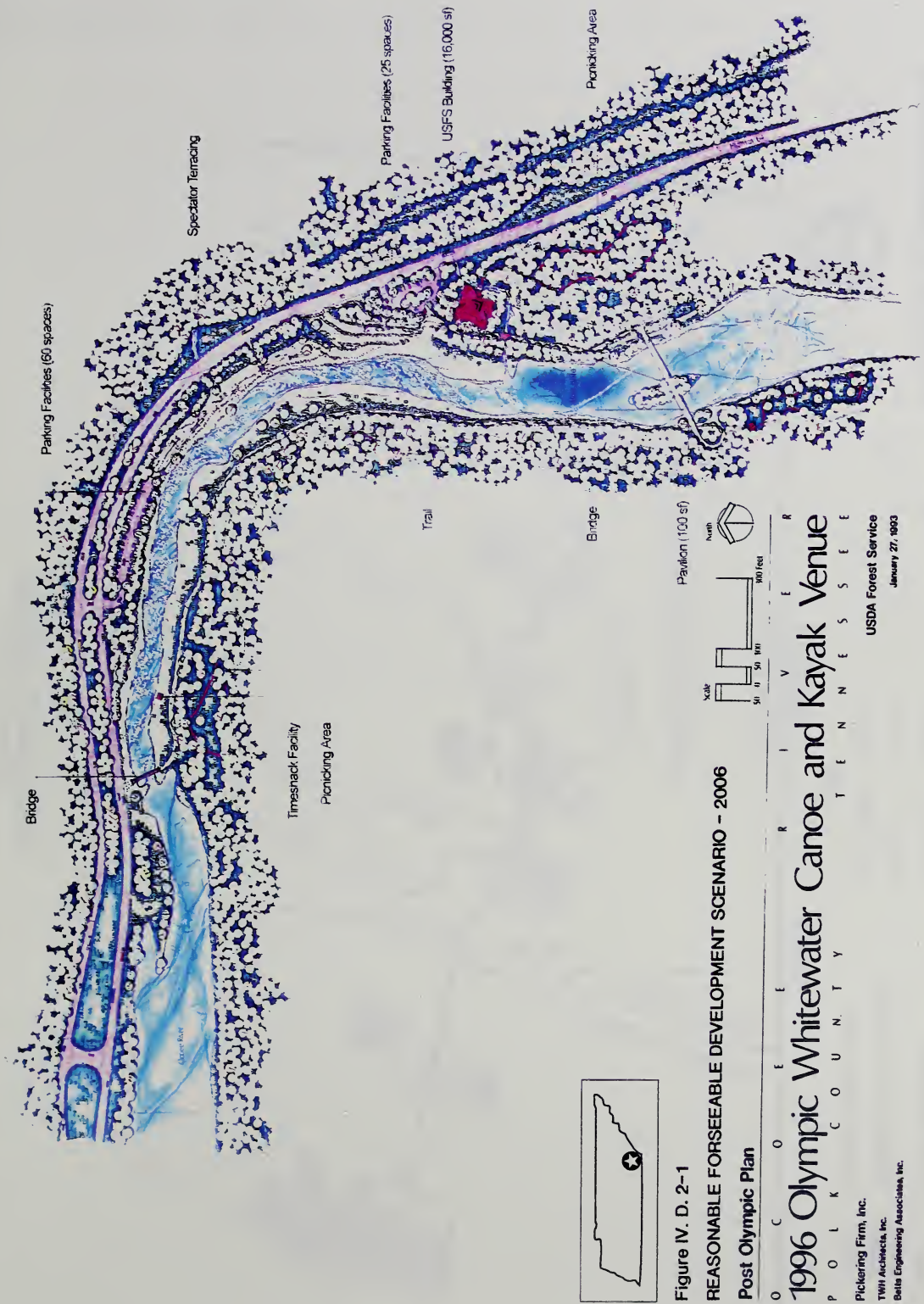


Figure IV. D. 2-2

2006 TOTAL TRAFFIC

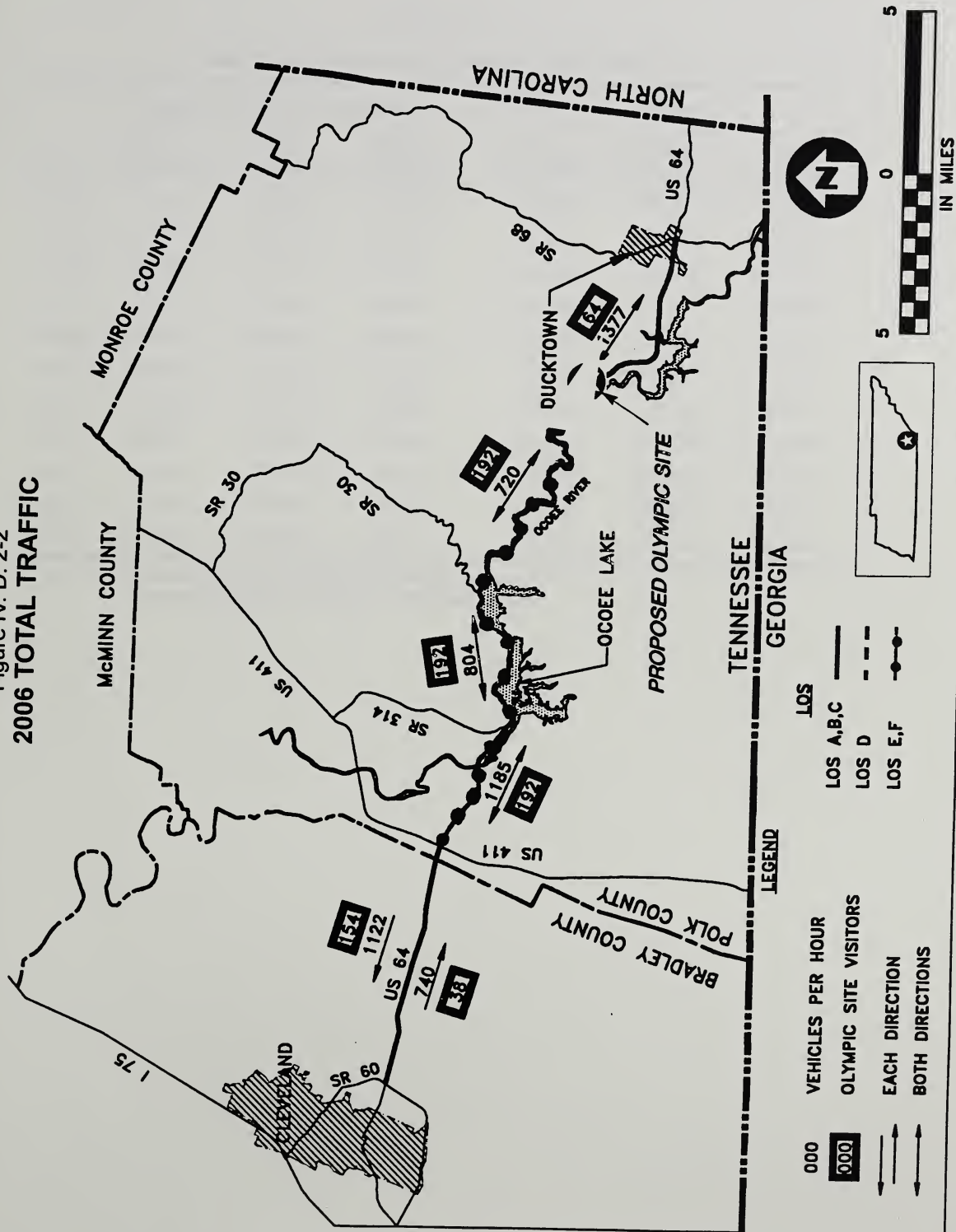


TABLE IV.D.2-1
Projections for Recreational Utilization of the Ocoee River

Year	Paying Commercial Customers			All Users		
	Low Projection	Middle Projection	High Projection	Low Projection	Middle Projection	High Projection
1996	159,485	163,245	167,004	224,584	229,879	235,173
1997	177,960	181,719	185,478	250,601	255,894	261,187
1998	185,434	189,193	192,952	261,125	266,419	271,712
1999	192,674	196,433	200,192	271,321	276,614	281,907
2000	199,680	203,439	207,198	281,186	286,480	291,773
2001	206,451	210,210	213,969	290,721	296,015	301,308
2002	212,988	216,747	220,506	299,927	305,220	310,513
2003	219,291	223,050	226,809	308,802	314,096	319,389
2004	225,359	229,119	232,878	359,593	322,642	327,935
2005	231,194	234,953	238,712	325,564	330,857	336,151
2006	236,794	240,553	244,312	333,450	338,743	344,036

Sources: Tennessee Department of Environment and Conservation, 1992;
Tennessee Department of Finance and Administration, 1993

33,450 to 344,036 users annually (Table IV.D.2-1). Also, paying customers using the Olympic Venue in 1997 could range from a low of about 34,100 to a high of 34,450. These projections also indicate that paying customers using the Olympic Venue in 2006 could range from a low of about 46,550 to a high of 48,500. With the addition of nonpaying commercial users and noncommercial users, potential usage would range from a low of about 46,550 to a high of Figure IV.D.2-2 Traffic

48,500 in 1997; and from a low of about 61,950 to a high of 63,900 in 2006. This represents 18.6 percent of the projected annual usage for both whitewater recreation sites on the Ocoee River. This estimate assumes a usage cap on the upper stretch, similar to that currently applied on the lower stretch as use approaches capacity.

The continuation of recreational operations on the Olympic Venue would result in some increase in local business activity, as measured by local sales volume. The change in the amount of local sales volume annually is anticipated to be an incremental gain as recreational use of the river increases, and would not be significant compared to existing economic activity in the ROI. Continued use of the Olympic Venue is projected to have an employment effect on direct employees of the outfitters and other, indirect jobs. The annual change in employment, personal income gain in the ROI, local population gain, and housing effects are anticipated to be minimal, given projections of increased use of the river for recreational use. The net local government fiscal effects are also anticipated to be incremental on an annualized basis.

Changes in population, employment, income, and sales as a result of the RFDS, are shown in Tables IV.D.2-2 and IV.D.2-3. The change in the amount of local sales volume annually is anticipated to be an incremental gain as recreational uses of the river increase. The change is not expected to be significant by the year 2006, when the local sales volume is forecast to include \$1,500,000 within the ROI directly attributable to recreational use of the Olympic Venue. However, the continued use of the upper stretch of the Ocoee River (the proposed site of the Olympic Venue) is anticipated to support slightly more employees of the outfitters and others indirectly. By 2006, the total economic effect of these new activities would not have a marked effect on the overall economy of the region.

After the Olympics, new employment could be generated to serve the growing number of visitors to the Ocoee River. By 2006, it is anticipated that the commercial whitewater outfitters could support the equivalent of 13 new full-time, permanent jobs (Table IV.D.2-3). The additional jobs created to

serve the growing number of visitors to the Ocoee River are expected to be part-time and seasonal. Other employment could be generated as new small commercial establishments are developed adjacent to the site, and additional campsites are developed in the vicinity. All of the new jobs would come from within the region. The total economic effect of these new jobs is not expected to be significant within the ROI through 2006.

In addition, jobs created to serve the increasing number of recreational visitors would generate a fiscal effect through 2006. The fiscal effects of the additional employment anticipated to occur from new commercial establishments and camping facilities to be located near the site and in the vicinity of the recreational sites along the river are expected to be minimal. Local government expenditures forecast to be directly attributable to the recreational use of the Olympic Venue are approximately \$27,95, with revenues of \$35,432 for a net local government fiscal impact of \$8,337.

D.2.c. Land Use

The proposed project is not projected to have significant land-use effects on-site or in the vicinity of the project. Although induced development would occur, significant residential, commercial, or industrial development in the ROI is not anticipated as a direct result of this project.

Minor changes in land use in response to the RFDS would be primarily manifested offsite. Additional parking and expansion of recreational facilities is anticipated in response to increased use of the upper stretch of the Ocoee. Induced commercial land uses could occur along area thoroughfares and would consist primarily of rafting outfitters and convenience commercial uses. It is possible that additional dining facilities and lodging could also be attracted to major thoroughfare intersections offsite, but it is unlikely that new permanent facilities would be attracted to the immediate vicinity of the venue site because of the transitory nature of the event.

D.2.d. Recreation

Recreational use of the Ocoee River would be beneficially affected under the RFDS. In addition to the day use building which could be used for a number of recreational purposes, other facilities developed as a direct result of the use of the site for recreation would include sites for outfitters serving the increasing number of recreationists, and new developed campsites within the region to meet the additional demands for camping facilities. Under Alternative 2 timing/scoring facilities, additional terraces for spectator seating, and picnicking facilities would not remain on-site.

TABLE IV.D.2-2
Operations Effects For 2006
Socioeconomic Issues Resource Assessment Matrix: RFDS

Effect Category 2006 Site Operation	Maximum Annual Effect	Local Effect Percent	Rational Threshold Value	Impact Assessment
Total Change in Local Sales Volume	\$2,957,000	0.102	8.632	Not Significant
Total Change in Local Employment	26	0.018	5.785	Not Significant
Total Change in Local Income by Place of Residence	\$359,179	0.020	5.678	Not Significant
Total Change in Local Population	0	0.000	1.355	Not Significant

Sources: U.S. Army Corps of Engineers, Economic Impact Forecasting System, 1993.

TABLE IV.D.2-3
Operations Effect Forecast Summary for 2006

Effect Category	Effect
Local Sales Volume Change	
Direct	\$1,500,000
Total (Direct, Indirect, Induced)	\$2,957,000
Local Employment Change	
Direct	13
Total	26
Local Income Change	
Direct	\$181,000
Total (Place of Residence)	\$359,179
Local Population	0
Number of School Children	0
Demand for Housing	
Rental Units	0
Owner-Occupied Units	0
Local Government Expenditures	\$27,095
Local Government Revenues	\$35,432
Net Local Fiscal Impact	\$8,337
Employee Relocations ^a	0

Note: ^a Assume all employment derived from local hires, therefore no immigration impacts.

Sources: U.S. Army Corps of Engineers, Economic Impact Forecasting System, 1993.

Changes in facility demand were estimated based on the scenario that includes long-term water releases for whitewater recreation in the upper section of the Ocoee River. The long-term additional demand is based on available current and projected data for recreational activities in the Ocoee Ranger District, and particularly for the whitewater recreation along the lower section of the Ocoee River (Table III.A.7-1, Ocoee River Commercial Customers, Selected Months, and Annual Reported Totals, Commercial Users and All Users, 1988-1992; and Table IV.D.2-1, Projections for Recreational Utilization of the Ocoee River). Standards for camping, picnicking, and hiking to support the additional whitewater activity were developed based on current use in the area and State recreation standards.

There would be an agreement between TVA and the Forest Service to schedule the release of water for commercial rafting approximately 26 days per year, providing additional recreational opportunity for up to 130,000 persons per year. This estimate is based on the upper section having a use cap equal to the lower section of 4,000 people per day. A put-in facility would be developed upstream of the Olympic site, probably just below the Ocoee No. 3 Dam. Design and Construction of the facility would be completed with a sensitivity for land and scenic values typically incorporated into Forest Service recreation projects.

Despite the growing number of recreational users on the Ocoee River, the number of outfitters serving the users is not anticipated to change. However, new outfitting permits would be issued to successful bidders as necessary. In 1992, there were 24 outfitters serving the recreational users of the river, with a total of 63 employees. In response to the increased demands for tour guides and other services provided by outfitters, it is anticipated that the existing outfitters would expand operations and provide additional employees to maintain the necessary level of service. Total outfitting employment is expected to increase by 13 new full-time jobs by the year 2006.

Additional effects under the RFDS include additional recreational facility demand, as well as effects on the recreational experience. Based on the projected increase in whitewater recreation resulting from the opening of the upper section of the Ocoee River, estimates have been prepared for the additional support facilities needed, based on available information and recreation standards, and are shown in Table IV.D.2-4. These needs are peak weekend needs based on maximum use of the upper Ocoee River, with an assumed cap of 4,000 people per day, with the assumed percentage use for each facility based on analysis of current use. The actual cap

would be determined after completion of a carrying capacity study.

New campsites would be developed in the region to serve the growing popularity of camping. It is estimated that 30 percent of all whitewater rafters stay 1 to 2 days in the Forest in camping facilities. The existing number of campsites could not accommodate the increasing demands. It is projected that new campsites would be required to adequately serve the increasing number of overnight whitewater rafters through 2006. The new campsites could be provided by the Forest Service at any of the developed recreational sites or by private owners in the ROI. An additional need is projected for horseback riding facilities, including stables and trails.

An additional recreational resource associated with the Ocoee River is the U.S. Highway 64 Scenic Byway. The interpretive areas that could be developed the right-of-way as part of this project would afford additional passive recreational opportunities to travelers and river users.

The interest in the venue site generated from holding the Olympic event may develop enough support to repair and provide interpretation facilities for the Old Copper Road as an NHRP site.

D.2.e. Visual Resources

Visual resources affected by the RFDS would change somewhat between 1996 and 2006. Under Alternative 2, the terraces for spectator seating, picnicking, and the lower pedestrian bridge would be absent, resulting in a reduced effect on visual resources. Visual simulation schematics (Figures IV.D.2-3 through IV.D.2-7) provide projected views of the project locale in a post event condition at the time of the RFDS.

- Visual Simulation 1 (Figure IV.D.2-3) illustrates a "Downstream Aerial View Looking East". Effects from the Olympic event shown in this view include the narrow channel section of the river, the timeshack structure, the parking lot, walkways/trails and vegetation treatment between the river and highway.
- Visual Simulation 2 (Figure IV.D.2-4) illustrates an "Upstream Aerial View Looking South". Effects from the Olympic event shown in this view include the narrow channel section of the river, the terraces, day use building, upper bridge, and general site treatment.
- Visual Simulation 3 (Figure IV.D.2-5) illustrates a "View from U.S. Highway 64". Effects from the Olympic event shown in this view include the treatment to the transition area between the river and highway and the limited

TABLE IV.D.2-4
Additional Facility Needs To Support Upper Ocoee River
Whitewater Recreation Seasonal Needs Assessment (June through August)

Activity	% Use	Population Basis ^(a)	Daily Carrying Capacity ^(b)	Seasonal Capacity ^(c)	Facilities Needed ^(d)
Camping	20	20,800	3.5 People per site	182 People per site	114 Sites
Picnicking	30	31,200	3.9 People per site	203 People per site	154 Sites
Hiking	20	20,800	13.3 People per mile	692 People per mile	30 Miles
Horseback Riding	10	10,400	5.3 People per mile	276 People per mile	38 Miles

^a Population of 104,000 based on 26 days per season and a cap of 4,000 per day.

^b Derived standard based on regional standards.

^c Seasonal Capacity = daily capacity x # of days in season = 3.5 x 52 = 182.
Days in season = actual days in season x 2 (assuming 1 night stay).

^d Facilities Needed = Population/Seasonal Carrying Capacity.



Figure IV. D. 2-3

VISUAL SIMULATION 1

**Downstream Aerial View
Looking East**



NOT TO SCALE

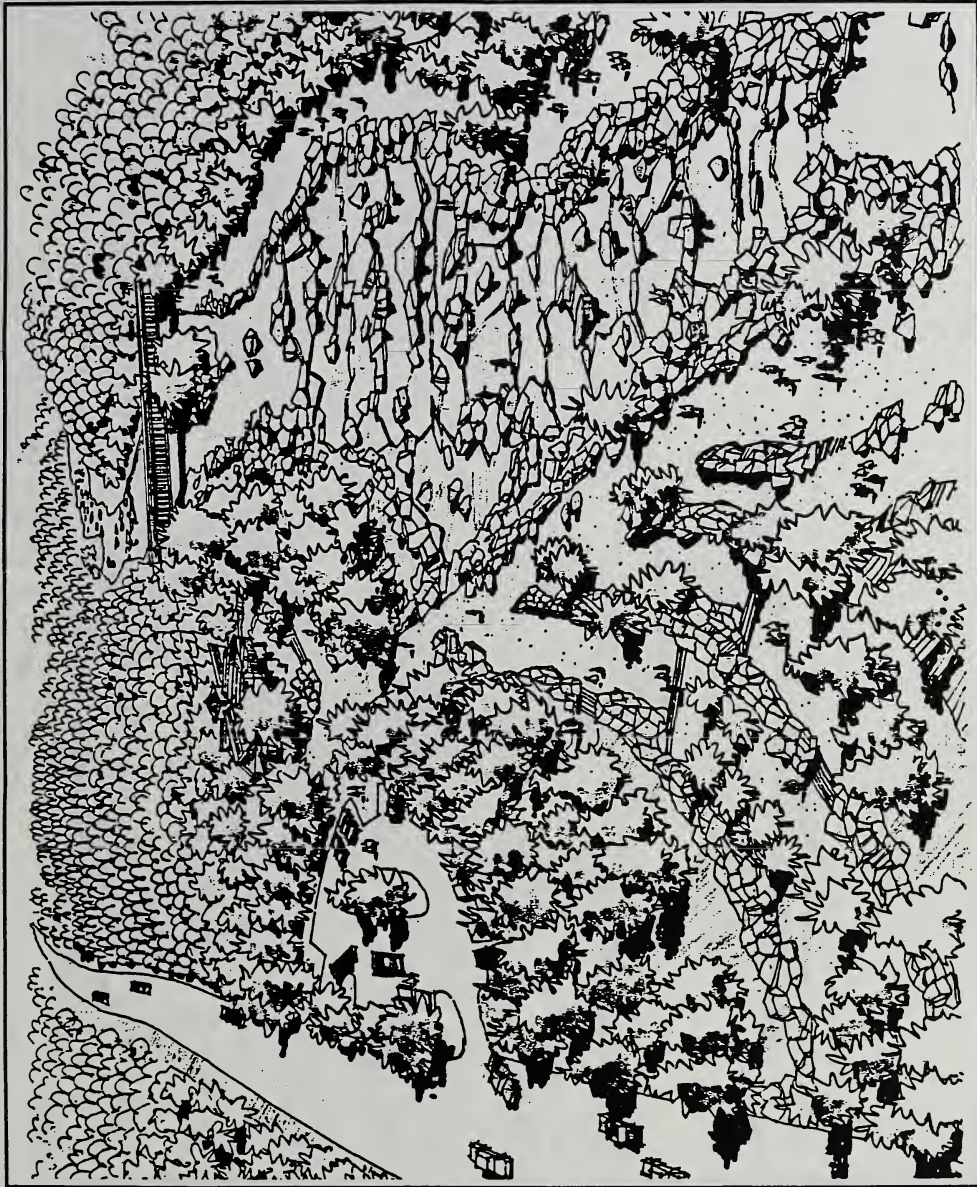


Figure IV. D. 2-4

**VISUAL
SIMULATION 2**
Upstream Aerial View
Looking South



NOT TO SCALE

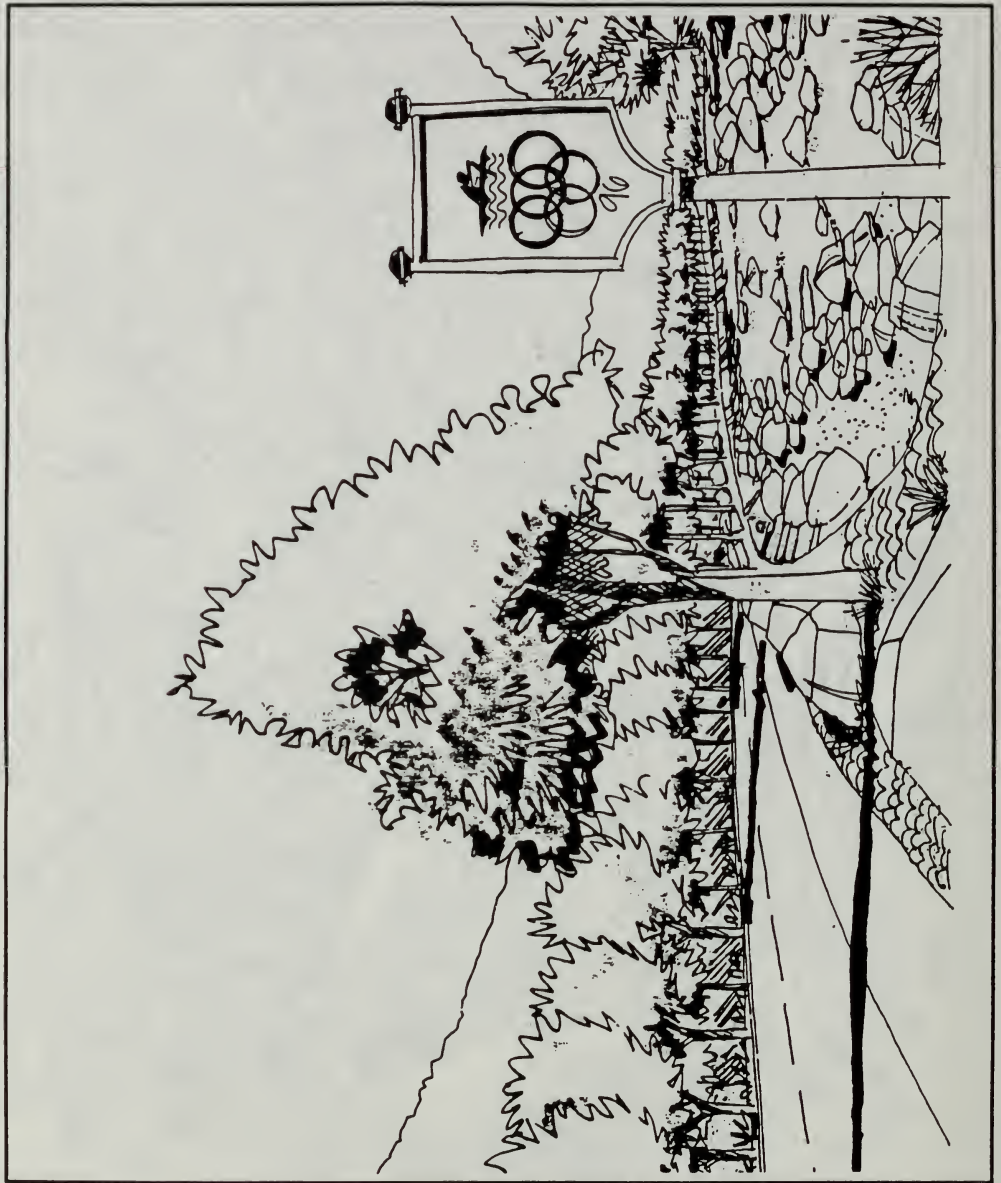
Figure IV. D. 2-5

**VISUAL
SIMULATION 3**

View From Highway 64



NOT TO SCALE



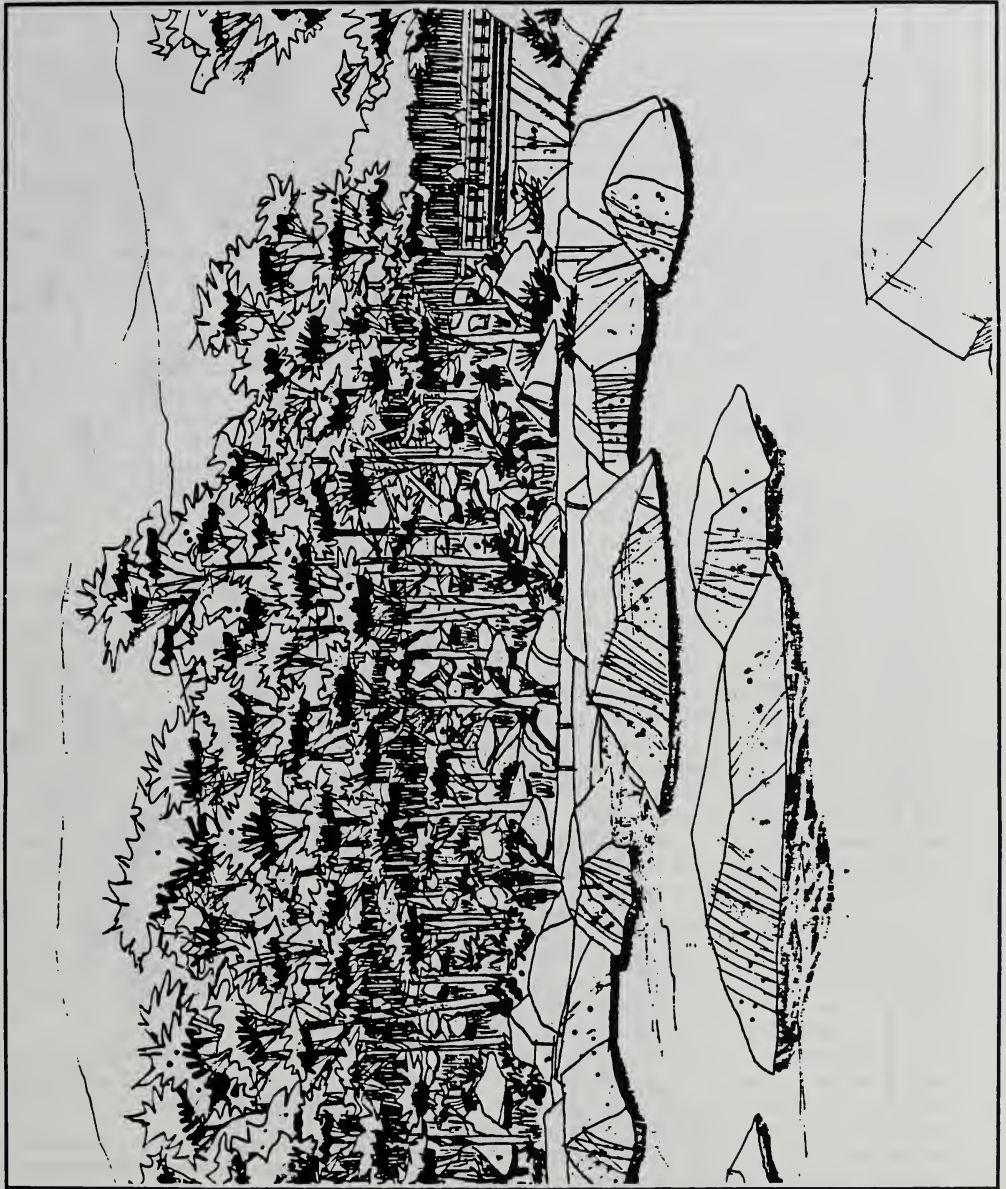


Figure IV. D. 2-6

VISUAL SIMULATION 4

View From Ocoee River
Looking Toward
Permanent Day Use Building



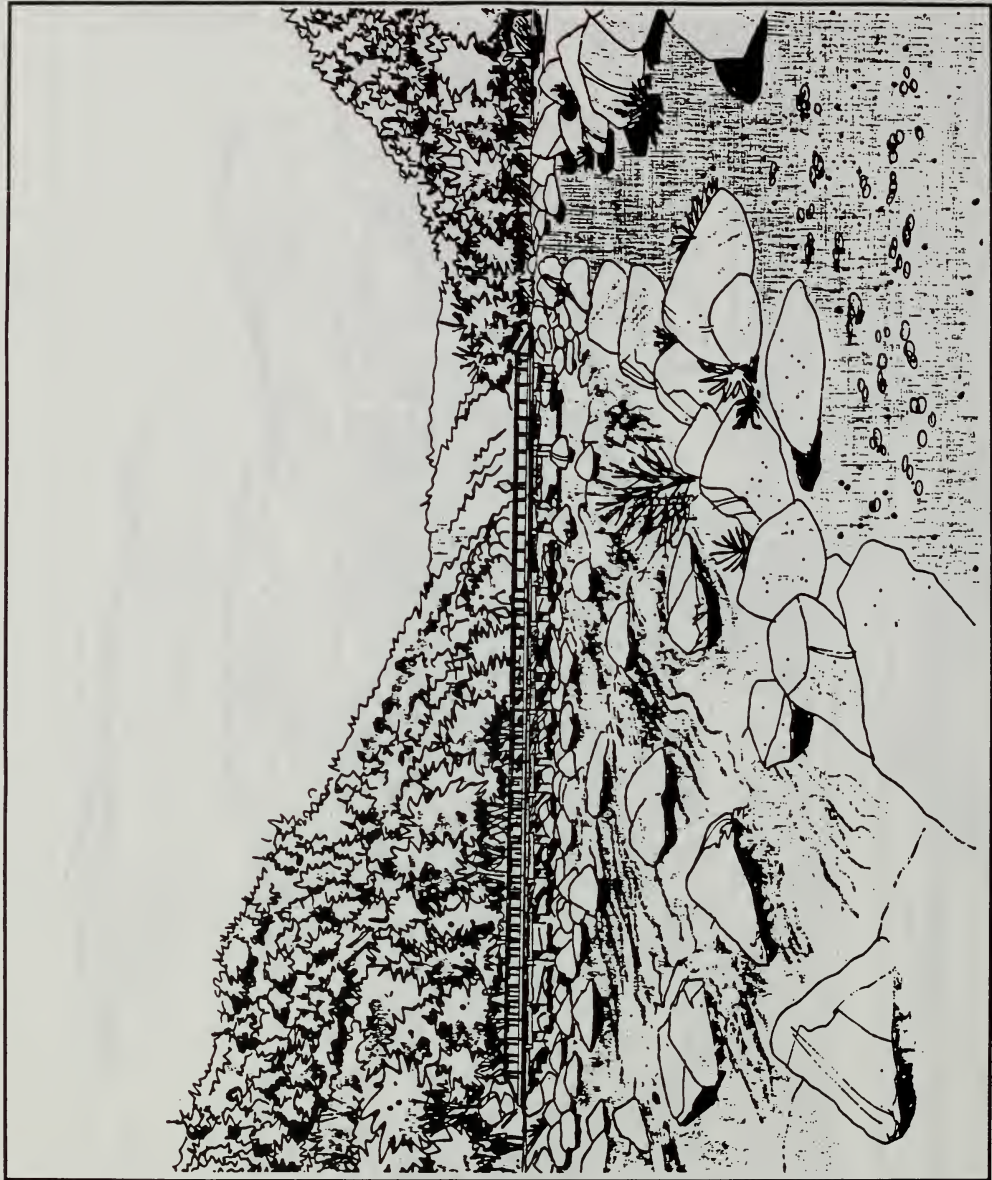
NOT TO SCALE

Figure IV. D. 2-7

**VISUAL
SIMULATION 5**
View From Terrace
Looking Downstream
Toward Lower Foot Bridge



NOT TO SCALE



degree of signing to remain for identification that the site hosted the Olympic event.

- Visual Simulation 4 (Figure IV.D.2-6) illustrates a "View from Ocoee River looking Toward Permanent Day Use Building". Effects from the Olympic event shown in this view include the treatment along the narrowed river channel, the upper bridge, the day use building, pedestrian accessibility to the river and extent of existing trees to remain.
- Visual Simulation 5 (Figure IV.D.2-7) illustrates a "View from Terrace Looking Downstream Toward Lower Foot Bridge". Effects from the Olympic event shown in this view include the treatment along the narrowed river channel, the lower foot bridge, pedestrian accessibility to the river and extent of existing trees to remain.

D.2.f. Hydrology

Post-Olympic whitewater recreational use of the competitive channel would result in permanent modification of the existing flows and operations on the Ocoee River between Ocoee No. 3 and No. 2 Dams. This would result in power losses in the TVA system from bypassing the Ocoee No. 3 Powerhouse and shifting generation from peak to off-peak periods at Blue Ridge and Ocoee No. 2 Powerhouses. Additional effects include a small dependable-capacity loss and the cost of Ocoee plant personnel to provide the recreational water releases. Some of the effects would occur only while water is being released into the riverbed and proposed competitive channel. A summary of TVA's preliminary assessment of the potential power and operational affects of recreational release is provided below. (Facsimile Transmittal, Robert Allen TDEC, July 6, 1993).

Three options were studied by TVA, each of which assumes releases of 1,600 cfs for 8 hours per day, beginning at 9:00 A.M. and ending at 5:00 P.M.

- Option 1 - Recreational releases similar to current releases from Ocoee No. 2 Dam (i.e., approximately 106 days/year);
- Option 2 - Friday, Saturday, and Sunday releases in June, July, and August (approximately 39 days/year); and
- Option 3 - Saturday and Sunday releases in June, July, and August (approximately 26 days/year).

Based on this assessment summary, TVA calculated the potential power costs associated with the three options. Three costs were calculated: present value (net present value of future diversion of

water), annual costs, and levelized annual costs. These costs are summarized in Table IV.D.2-5. All costs were based on a period of 27 years, and the net present values were based on a 12 percent interest rate (Facsimile Transmittal, Robert Allen, TDEC, July 6, 1993).

According to TVA sources, although no formal agreement has been reached on post-Olympic use of the proposed competitive channel, Option 1 is not acceptable, because the cost of lost power to TVA would be prohibitive (Goranflo, 1993), as Ocoee No. 3 Powerhouse provides 42 percent of the total generating capacity of the Ocoee projects. If a permanent competitive channel is constructed, either Option 2 or Option 3 most likely would be selected as a release schedule.

Water availability was calculated using Options 2 and 3 (39 and 26 days of release per year, respectively). For Option 2, with Friday, Saturday, and Sunday 8-hour releases during June, July, and August, at an estimated flow of 1,600 cfs, the annual release would total approximately 41,256 acre-feet/year. The total flow of the river for that same time period and flow rate, but at 24 hours per day, would be approximately 1.16 million acre-feet/year. Therefore, the annual release from Ocoee No. 3 for the proposed competitive channel would comprise approximately 3.6 percent of the total flow. For the entire 27-year time period (1995-2021), which includes the 147-day schedule during 1995-1996 and leap years, releases into the riverbed diverting water from the powerhouse would require approximately 3.8 percent of the total water under this option.

For Option 3, with Saturday and Sunday 8-hour releases during June, July, and August at an estimated flow of 1,600 cfs, the annual release would total approximately 27,504 acre-feet/year. The total flow of the river for that same time period and flow rate, but at 24 hours per day, is approximately 1.16 million acre-feet/year. Therefore, the annual release from Ocoee No. 3 for the proposed competitive channel would comprise approximately 2.4 percent of the total flow. For the entire 27-year time period (1995-2021), which includes the 147-day schedule during 1995-1996 and leap years, releases into the riverbed diverting water from the powerhouse would require approximately 2.7 percent of the total water under this option.

Over a 27-year time span, the water availability on the Ocoee River without the proposed competitive channel would be approximately 31.3 million acre-feet. The total pre-event, event, and post-Olympic water use for 27 years for the proposed competitive channel, at 1.19 million acre-feet for Option 2 (39 days/year) or 843,107 acre-feet for Option 3 (26 days/year), would be approximately

TABLE IV.D.2-5
Potential Power Costs of Recreational Releases At Ocoee No. 3 Dam

Release Option	Net Present Value (\$000)	Annual Costs (1992 \$000)	Levelized Annual Costs (\$000)
1	14,900	1,230	1,870
2	2,900	410	620
3	2,800	230	350

3.8 percent and 2.7 percent of the total water availability, respectively.

Therefore, the proposed competitive channel, when running, would decrease water availability to Ocoee No. 3 Powerhouse by approximately 3.0 to 4.0 percent (maximum), depending on the release option selected, and assuming that the powerhouse normally operates 24 hours per day, 365 days per year. (This is a conservative assumption, since the powerhouse is normally used for peaking production only. The actual decrease in water availability would be much smaller.)

During the times that water would be released into the proposed competitive channel from Ocoee No. 3 Powerhouse, operations would be effected at Blue Ridge and Ocoee No. 2 Dams, in addition to Ocoee No. 3 Dam. Ocoee No. 3 Reservoir does not have sufficient storage capacity to provide all of the desired releases for the current Ocoee No. 2 recreational release schedule, plus the additional Ocoee No. 3 release schedule. Careful coordination of releases from each component of the system would be necessary to ensure enough water is available at the scheduled times, and to avoid flow conditions adverse to whitewater recreational activities. Blue Ridge Lake would have to release water for a few hours early in the morning to ensure sufficient water for Ocoee No. 3 releases occurring later in the day.

Normal hydropower releases combined with local inflows currently provide the whitewater releases at Ocoee No. 2 Dam. Storage in Blue Ridge Lake could be required to provide the Ocoee No. 3 recreational flows, which could conceivably lower the lake level; however, this effect should be negligible except in years experiencing drought conditions, when the Blue Ridge Lake level could be lowered by approximately 1 foot.

Operational studies of the Ocoee River system conducted by TVA showed that almost 8 million kWh of hydroelectric energy would be lost each summer to provide the 26-day recreation schedule below Ocoee No. 3 (Option 3). In addition, approximately 5 million kWh of energy would be shifted from peak periods to off-peak periods at the Blue Ridge, Ocoee No. 2, and Ocoee No. 3 Powerhouses. A small loss of 200 kW of dependable capacity would be incurred at the Blue Ridge project (Jensen, 1993).

TVA evaluated these losses in power by determining the alternative cost of producing that power. The cost of supply from the TVA power system corresponds to the magnitude of the load being served. During the weekends, the power demands are normally lower, and energy losses can be supplied with less costly, more efficient generating

units than would be the case if whitewater releases were made during the weekdays when power demands are high (peak periods). The cost to provide the Ocoee No. 3 recreational releases was generally based on replacement energy costs from TVA's coal-fired plants. On rare occasions, TVA might find it necessary to use purchased power from other utilities or other higher-cost alternatives.

Future power costs for the replacement power can be expected to vary as costs escalate in future years (Allen, 1993). The levelized annual cost for the replacement power over the 27-year evaluation period (Table IV.C.10-1) was determined to be \$350,000 per year for Option 3. The present value of these power costs for the next 27 years would be \$2.8 million, based upon a 12 percent interest rate.

D.2.g. Threatened, Endangered, and Sensitive Species

Certain populations of TES plant species in the Ocoee River gorge are likely to be affected by long-term increases in visitation to the gorge due to increased popularity of the area and potential future use of the course. Effects on TES wildlife species are not expected. Those plant species that could be affected in the future are discussed below and included in Appendix I.

Populations of Ruth's Golden Aster growing on boulders and areas readily accessible from the shoreline downstream of the course could be susceptible to negative effects such as trampling and picking. This species would be continued to be monitored by the affected agencies (Forest Service, TVA, TDEC, and USFWS) and potential negative effects could be mitigated by use of educational and restrictive measures. The agencies would act in close consultation with the USFWS to coordinate protective measures for this species.

Microhabitats in which Nevius's stonecrop and Carey saxifrage occur (downstream of the proposed Olympic Venue) are fragile, and damage could be caused by people climbing and trampling plants or breaking off small ledges that support individuals of the species. Such activity would be more likely as visitation increases in the Ocoee River gorge.

Trampling is less likely to be a threat for Fraser loosestrife because it occurs primarily in woodlands, areas which are less likely to be used by visitors than boulders and other areas with open views of the river. Also, Fraser loosestrife is a tall plant that is less likely to be inadvertently trampled than smaller herbs (e.g., pink lady slipper).

Chalk maple is very similar to sugar maple, which grows in association with most of the populations in the Ocoee River Gorge, and it is unlikely to

be noticed. Increases in visitation are not likely to affect the chalk maple over the long-term.

Pink lady slipper is often sought by plant fanciers, and this species could be threatened by increased visitation. Southern lobelia could be potentially threatened by increased visitation and trampling or picking.

Bush honeysuckle and horse sugar occur in woodland areas not likely to have significantly increased visitation. Trampling and inadvertent destruction are less likely because they are hardy, small shrubs that are easily observed and avoided.

E. REQUIRED DISCLOSURES

This section of the EIS addresses required disclosures relating to the proposed action. Information pertaining to possible conflict with jurisdictional plans, unavoidable environmental effects, productivity relationships, commitment of resources, and consistency with the Forest Plan is provided below.

E.1. Possible Conflicts With Plans and Policies of Other Jurisdictions

The possibility that implementation of the proposed action would conflict with jurisdictional plans and policies is minimal.

TDOT and county transportation plans could be affected by temporary traffic congestion relating to Olympic events; however, if other measures for abating congestion and accident potential are implemented, thoroughfare improvements should not be required to accommodate this short-term effect. Access to on-site parking areas would require TDOT approvals, as would Olympic events and facilities that would occupy land within thoroughfare rights of way.

The only agency/jurisdiction that might be affected by the hydrology aspects of the alternatives is TVA. As covered in Chapters III and IV of the EIS, the Ocoee River is controlled by the TVA, and the water is used by the TVA for hydroelectric power generation. Therefore, the TVA typically diverts the flow away from the natural channel into flumes or tunnels which discharge into TVA-owned power generating structures. With the exception of the no-action alternative, the use of any of the alternatives for the proposed competitive channel would result in modification of the existing flows and operations on the Ocoee River between Ocoee No. 3 and No. 2 Dams. For Alternatives 1, 2, and 3 during the time the proposed competitive channel is operating, which would be during the daylight hours only, TVA would have to release water into the streambed instead of into the tunnel from Dam No. 3 to Powerhouse No. 3. Normal operation involves a

bypass of the natural riverbed. Releasing water to the riverbed will necessitate bypassing Ocoee No. 3 Powerhouse, making power generation unachievable from that powerhouse while the proposed competitive channel is running.

The Olympic event would require atypical signage for shuttle buses, VIP and spectator directions, and federal and/or state regulations could be effected by variances from policy requirements.

E.2 Probable Environmental Effects That Cannot Be Avoided

The implementation of Alternatives 1, 2, or 3 would result in some adverse environmental effects. The severity of these effects would be minimized by close adherence to the mitigation measures proposed for each resource category as described in this Chapter. Unavoidable effects are summarized below:

- Temporary degradation of air quality during construction in the vicinity of the site would take the form of increased dust.
- Traffic related to the Olympic events would temporarily lower the LOS along the two-lane portion of U.S. Highway 64. Anticipated shuttle bus traffic and tractor-trailer traffic through Ocoee Gorge would temporarily increase the probability of an accident.
- There would be temporary erosion and sedimentation of some soils resulting from construction activities.
- The proposed venue would involve defining a narrower channel on the Ocoee River within the confines of the existing riverbed to form challenging and continuous whitewater. As a result of the channel construction, water velocity and surface elevation changes would increase, and there would be some potential for scouring and erosion. Implementation of Alternatives 1, 2, and 3 would result in a slight decrease in ground permeability, and a temporary modification of flows between Ocoee No. 3 and No. 2 Dams.
- An increase in the suspended solids load of the Ocoee River would occur during both construction and reconditioning. During construction this increase would range from 28% above baseline conditions to 85 % above baseline. During site reconditioning suspended solids would increase 399% for Alternative 1, 54% for Alternative 2, and would not increase under Alternative 3.
- There would be a temporary loss of recreational resources during construction and opera-

tion of the Olympic events. The principal loss would be to swimming and picnicking at the lower "Blue Hole" area. The remainder of the upstream area is available for recreation.

- Scenic values would be temporarily affected due to removal of vegetation, debris, and alteration to sightseeing resources viewed from U.S. Highway 64.
- Two small riverine wetlands (approximately 0.6 acres) would be lost, and nine palustrine wetlands would be disturbed during construction of the venue.
- A segment of the Old Copper Road would be adversely affected during construction and venue operation.

E.3. Relationship Between Short-Term Use and Long-Term Productivity

Short-term uses are those uses that generally occur annually. Long-term productivity refers to the ability of the land to produce a continuous supply of a resource.

Air emissions related to construction would cause elevated short-term concentrations of particulates for receptors close to construction areas. The elevated concentrations would fall off rapidly with distance. No long-term effects on air quality from fugitive dust are anticipated. Vehicle engine combustion would cause increased concentrations of HC, CO, NO_x and TSP. These emissions would be expected to fall off rapidly with distance, and not to result in significant long-term effects.

Long-term productivity of the recreational and visual resources would be enhanced by the proposed action due to improvements in the availability of river capacity and care being exercised to enhance visual resources.

The only short-term use of resources that would result in changes to long-term productivity (the capability to provide resources) concerns water availability. As discussed previously, operation of the proposed competitive channel in any of the alternative scenarios would affect water available to TVA for power generation. The water would remain in the TVA system and would be impounded in Lake Ocoee, as it is now; however, for the periods during which recreational releases into the competitive channel occur, TVA would be unable to generate full-capacity power from Powerhouse No. 3.

The alternatives, especially the Alternatives 2 and 3 with a permanent competitive channel for post-Olympic use, would result in power losses to the TVA system from bypassing the Ocoee No. 3 generation facilities and shifting generation from

peak to off-peak periods at Blue Ridge and Ocoee No. 2 Powerhouses. Additional effects include a small dependable-capacity loss and the cost of Ocoee plant personnel to provide the recreational releases. Some of the effects would only occur while water is being released into the riverbed and proposed competitive channel.

Long-term, the 3.0 to 4.0 percent (maximum) loss in generating capacity is relatively small. The hydropower unit at Ocoee No. 3 Powerhouse supplies about 0.8 percent of the total TVA generating capacity. The Ocoee projects combined supply about 2 percent of the total TVA generating capacity, alterations to existing operations and the associated costs could potentially affect rate structures in order to compensate for the losses.

A segment of the Old Copper Road would be affected. These effects on the road as a cultural resource eligible for the NRHP may have some long-term ramifications for use/public interpretation.

E.4. Irreversible and Irretrievable Commitments of Resources

An irreversible commitment of resources results from a decision to use or modify resources that are renewable only over a long period of time. Long-term resource commitments required by the project, primarily fossil fuels for energy and construction materials, would not be recoverable. Short-term commitments of labor and capital would result from construction activities.

The only potential hydrologic resource to be affected is the renewable resource of water. The water itself would not be modified, but rather would be used for recreation instead of power production. All of the water would be retained in the river system in the same quantities and quality as pre-channel construction and operation. Only its use would be modified. In addition, this change in use should not be an irreversible or irretrievable commitment of the resource, as use of the water dependent on TVA. At any time, TVA could suspend the recreational releases to conserve water and/or provide power.

In order to quantify TVA's costs associated with proposed recreational releases on the Ocoee River, especially with respect to the proposed Ocoee No. 3 recreational flows, TVA conducted operational studies of the river system. Based on the kilowatt hours of hydroelectric energy to be lost, the losses in power were evaluated by determining the alternative cost of producing that power. The cost of producing the Ocoee No. 3 recreational releases was based by TVA on replacement energy costs from their coal-fired plants.

On rare occasions, TVA might find it necessary to use purchased power from other utilities or other higher-cost alternatives. However, the peaking power that would need to be purchased (if any) would be a small amount. Based on the fact that Ocoee No. 3 Powerhouse provides only about 0.8 percent of the total generating capacity of the TVA system, it is not plausible that new coal-fired power plants would have to be built to provide this supplemental power, which would have an effect on a nonrenewable resource.

The loss of a section of the Old Copper Road would be irreversible, as the road is a unique historic cultural resource.

E.5. Consistency With Forest Plan Standards

Planning for units of the National Forest System involves two levels of decisions. The first is the development of the FLRMP, which provides direction for all resource management programs, practices, uses and protection measures. The FLRMP consists of both Forest-wide and area-specific standards and guidelines that provide for land uses with anticipated resource outputs under a given set of management constraints. The Forest EIS is the environmental review for the FLRMP. This EIS,

prepared for the proposed 1996 Olympic Venue, is tiered to the CNF EIS (USDA, 1986a), and uses CNF FLRMP goals and direction in conducting environmental effects analyses (USDA, 1986b).

To ensure consistency with the FLRMP Alternatives 1, 2, and 3 were compared to goals and management guidelines. Table IV.E.5-1 identifies FLRMP categories, summarizes the goals, and evaluates relative consistency of the alternatives with these goals. Categories are listed in the order in which they appear in the CNF FLRMP (USDA, 1986b). From Table IV.E.5-1, it is evident that with minor exceptions identified, this EIS is responsive to Forest Plan goals and consistent with its overall intent. However, the FLRMP would have to be amended to place the site in MAI if development is allowed.

The RFDS visualizes site conditions in 2006, 10 years after the Olympic events are held. The consistency of the RFDS with the FLRMP was determined by comparing it to the desired future condition of the CNF as discussed in Chapter IV of the FLRMP (USDA, 1986b). Table IV.E.5-2 depicts these comparisons. Categories are listed in the order in which they are presented in the FLRMP.

TABLE IV.E.5-1
Forest Plan Consistency - Alternatives 1, 2, and 3

Category	Forest Plan Goals	Consistency of Alternatives with Goals
Wilderness	Preservation of character of Big Frog and Little Frog Wildernesses.	Care has been taken to eliminate any adverse effects to wildernesses.
Off-Road Vehicles	Allow only on designated ORV roads.	Not applicable to alternatives.
Roads	Allow construction of local roads in CNF.	Alternatives minimize new road development. Temporary access would be required for venue construction.
Minerals	Leasing for exploitation to be by permit (except in Wildernesses)	None of the alternatives would effect mineral resources.
Recreation	Continue provision of developed and dispersed recreational facilities. Increase trail density.	Alternatives would stimulate opportunities for additional developed and dispersed recreation. Pressure on existing facilities would result during Olympic events. An additional trail would be provided by alternatives.
Wildlife and Fish	Continue existing practice of habitat management and protection.	None of the three alternatives would significantly affect wildlife and fisheries resources.
Timber	Selective cutting of timber to be permitted.	Minimal timber cutting would result from implementation of any alternatives.
Fire Protection	Fire prevention measures to be improved and response time increased.	Alternatives are consistent with fire protection goals.
Soil and Water	Minimize soil erosion, sedimentation, and depletion.	Adequate soil erosion and sedimentation control measures are proposed in mitigation measures. Best management practices would minimize soil depletion.

TABLE IV.E.5-1 - Continued
Forest Plan Consistency - Alternatives 1, 2, and 3

Category	Forest Plan Goals	Consistency of Alternatives with Goals
Unique and Special Resources	Rock Creek Gorge will continue to be a scenic resource.	Rock Creek Gorge is several miles west of the proposed Olympic Venue and would not be effected by the alternatives.
Land Ownership Adjustment	Emphasize consolidation of CNF, and elimination of isolated "land islands."	Not applicable to alternatives.
Visual	Meet VQOs of management areas.	Some disturbance to visual resources would be evident during construction; however, mitigation measures would provide an adequate means to retain overall consistency with VQO of retention.

Source: USDA, 1986b.

TABLE IV.E.5-2
Forest Plan Consistency - RFDS

Category	Forest Plan Desired Condition	Consistency of RFDS With Desired Future Condition
Timber	Composition of timber types to change with time.	RFDS envisions revegetation of areas affected by construction and operation of Olympic Venue, excluding areas where permanent facilities are located.
Cultural Resources	Increased protection of significant sites.	Mitigation of affected portions of Old Copper Road incorporated into RFDS.
Wilderness	Preserve wilderness attributes.	RFDS was formulated to result in minimal effect on Big Frog and Little Frog Wildernesses.
Land Ownership Adjustment	Reduce CNF perimeter boundary by 200-270 miles.	Not applicable to RFDS.
Transportation	Increase local road miles by factor of approximately two.	Indirect effect of increased recreation opportunities could result in new local roads to access camping areas.
Minerals	Little change from existing condition.	RFDS would not affect mineral extraction.
Recreation	ROS to range from primitive to rural. Expand recreational opportunities and trail systems.	The RFDS would result in additional campsites and hiking trails. As U.S. Highway 64 is a National Scenic Byway, additional interpretive opportunities should result. Continued use of the upper Ocoee River for whitewater activities would provide additional recreation opportunities.
Wildlife	Provide adequate habitat and manage threatened and endangered species.	TES will be monitored by Forest Service and protective measures would be implemented after consultation with the USFWS as required.

TABLE IV.E.5-2 - Continued
Forest Plan Consistency - RFDS

Category	Forest Plan Desired Condition	Consistency of RFDS With Desired Future Condition
Fisheries	Identify species to manage. Implement stocking program.	The RFDS would not affect site or downstream aquatic resources. Existing acidic conditions of the river at the site would not increase as a result of the RFDS.
Fire	Control fires to 300 or less acres. Improve response time.	Not applicable to RFDS.
Soils	Maintenance of soil productivity.	Soils would remain stable due to additional landscaping and revegetation.
Water	Slightly increase supply and improve water quality.	The RFDS would result in a slight decrease (less than 4%) in water availability for TVA. However, flow to the upper Ocoee River would increase. Water quality would slowly, but continuously, improve.
Visual	Foster visual diversity.	The RFDS would result in minor changes to the landscape and viewsheds of the site locale. If development is carefully planned and VQO management direction followed, VOQs would be met.
Pests	Not envisioned to be a problem.	Not applicable to RFDS.
Socioeconomics	Reduction in perimeter boundaries would permit growth of adjacent communities.	The RFDS would have an economic growth effect on adjacent communities.

Source: USDA, 1986b.

APPENDICES

APPENDIX A

LIST OF PREPARERS

The following list includes all the individuals and agencies who contributed to the preparation of the Environmental Impact Statement for the proposed 1996 Olympic Whitewater Slalom Venue, Ocoee River, Cherokee National Forest, Polk County, Tennessee.

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APPENDIX B

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The following list includes all the individuals and agencies who received copies of the Draft Environment Impact Statement for the proposed 1996 Olympic Whitewater Slalom Venue, Ocoee River, Cherokee National Forest, Polk County, Tennessee.

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Recreation Services
Solid Waste Management
Water Pollution Control

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East TN Development District
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Chattanooga Nature Center
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Friends of the Hatchie
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Triad River Runners
Harpeth River Coalition
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APPENDIX C

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APPENDIX D

INDEX

The following listing of terms is intended to assist the reader in locating a broad range of subject areas discussed in this document. The reference listing and page numbers are not intended to be complete. It is suggested that the reader use this index, the table of contents, and the glossary (Appendix E) to obtain additional information.

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APPENDIX E

GLOSSARY OF TERMS AND ACRONYMS USED IN THE EIS

APPENDIX E

GLOSSARY OF TERMS

100-Year Flood Zone: A flood with a return period of 100 years.

Zone: The portion of the floodplain that is inundated by the 100-year flood.
Given chance in any year = 1% (100 = recurrence interval in years).

500-Year Flood Zone: A flood with a return period of 500 years.

Zone: The portion of the floodplain that is inundated by the 500-year flood.
Given chance in any year = 0.2% (500 = recurrence interval in years).

A-Weighted Sound Level (dBA): A number representing the sound level that is frequency weighted according to a prescribed frequency response established by the American National Standards Institute (ANSI S1.4-1971) and accounts for the response of the human ear.

Acre Feet: The volume that would cover one acre to an average depth of one foot.

Acute Standards (Criteria): EPA published allowed concentration of a contaminant not having an adverse effect on aquatic organisms when undergoing short term exposure.

Affected Environment: The biological and physical environment that will or may be changed by actions proposed and the relationship of people to that environment.

Ambient Air Quality Standards: Standards established on a state or federal level that define the limits for airborne concentrations of designated "criteria" pollutants (nitrogen dioxide, sulfur dioxide, carbon monoxide, total suspended particulates, ozone and lead), to protect public health with an adequate margin of safety (primary standards) and to protect public welfare, including plant and animal life, visibility and materials (secondary standards).

Anakeesta: A general term for rocks that have potential to produce acid drainage. Named for the Anakeestor formation.

Archaeology: A scientific approach to the study of human ecology, cultural history and cultural process.

Artifact: An object produced by human workmanship, especially a tool, weapon or ornament of archaeological or historical interest.

Attainment Area: A region that meets the National Ambient Air Quality Standards for a criteria pollutant under the Clean Air Act.

Biogenic Emissions: Leaf-biomass emissions from a forested area.

Biological Evaluation: An assessment required by the Endangered Species Act of 1973 to identify any threatened, endangered or sensitive species which are likely to be affected by a proposed management action, and to evaluate the potential effects of the proposed action on the species of their habitats.

Capacity: The maximum quantity of a public service that can be supplied due to existing limitations of public infrastructure.

Carbon Monoxide (CO): A colorless, odorless, poisonous gas produced by incomplete fossil-fuel combustion. One of the six pollutants for which there is a national ambient standard. See Criteria Pollutants.

Chronic Standards: EPA recommended or allowed concentration of a contaminant not expected to be toxic or have adverse effect on aquatic organisms when undergoing long term exposure.

Class I, II, and III Areas: Under the Clean Air Act, clean air areas are divided into three classes. Very little pollution increase is allowed in Class I areas, some increase in Class II areas, and more in Class III areas. National parks and wilderness areas can receive mandatory Class I protection. All other areas start out as Class II. States can reclassify Class II areas up or down, subject to federal requirements.

Climax Plant Community: The final or stable biotic community in a developmental series.

Council on Environmental Quality (CEQ): An advisory council to the President established by the National Environmental Policy Act of 1969. It reviews Federal programs for their effect on the environment, conducts environmental studies and advises the President on environmental matters.

Criteria Pollutants: The Clean Air Act required the Environmental Protection Agency to set air quality standards for common and widespread pollutants after preparing "criteria documents" summarizing scientific knowledge on their health effects. Today there are standards in effect for six "criteria pollutants": sulfur oxide (SO₂), carbon monoxide (CO), particulate matter less than 10 microns in diameter (PM₁₀), nitrogen dioxide (NO₂), ozone (O₃) and lead (Pb).

Cultural Resources: The physical remains of human activity (artifacts, ruins, burial mounds, petroglyphs, etc.) and conceptual content or context (as a setting for legendary, historic or prehistoric events, as a sacred area of native peoples, etc.) of an area of prehistoric or historic occupation.

Decibel (dB): A unit of measurement on a logarithmic scale which describes the magnitude of a particular quantity of sound pressure or power with respect to a standard reference value.

Demand: The average daily amount of a public service, i.e., potable water, sanitary sewerage, electricity, etc., required by the public.

Discharge: Release of groundwater in springs or wells, through evapotranspiration, or as outflow from the basin.

Diversity: The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan.

Drawdown: The distance between the static water level and the surface of the cone of depression.

Ecosystem: A complete, interacting system of organisms considered together with their environment (for example; a marsh, a watershed or a lake).

Effects: Physical, biological, social and economic results (expected or experienced), resulting from achievement of outputs. Effects can be direct, indirect and cumulative.

Effluent: The outflow of safe, processed water from a sanitary sewer treatment facility.

Endangered Species: Any species, plant, or animal, which is in danger of extinction throughout all or a significant portion of its range. Endangered species are identified by the Secretary of the Interior in accordance with the 1973 Endangered Species Act.

Environmental Analysis: An analysis of alternative actions and their predictable short and long-term environmental effects which include physical, biological, economical, social and environmental design factors and their interactions.

Environmental Assessment: A concise public document for which a Federal agency is responsible that serves to:

- (1) Briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact.
- (2) Aid an agency's compliance with the National Environmental Policy Act when no environmental impact statement is necessary.
- (3) Facilitate preparation of an environmental impact statement when one is necessary.

Environmental Impact Statement, Draft (DEIS): A detailed written statement as required by Section 102(2)(C) of the National Environmental Policy Act.

Environmental Protection Agency (USEPA): The independent federal agency, established in 1970, that regulates environmental matters and oversees the implementation of environmental laws.

Erosion: Wearing away of soil or rock by weathering and the action of streams, wind, rain and groundwater.

Existing Land Use: The current use of a parcel of land, typically designated using an approved land use coding system.

Flood: A general and temporary condition of partial or complete inundation of normally dry land areas from the overflow of inland or tidal waters, or, the unusual and rapid accumulation or runoff of surface waters from any source. (FEMA definition).

Floodplain: Any land area susceptible to being inundated by water from any source. (FEMA definition).

Floodway (Regulatory Floodway): The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood (100-year flood) without cumulatively increasing the water surface elevation more than a designated height (FEMA standard is one foot) (FEMA definition).

Forage: All browse and nonwoody plants available to livestock or wildlife for feed.

Forest Plan: Cherokee National Forest Land and Resource Management Plan (April 1, 1986).

Fossil: A remnant or trace of an organism of a past geologic age, as a skeleton or leaf imprint, embedded in the earth's crust.

Freeway: A multilane divided highway having a minimum of two lanes for exclusive use of traffic in each direction and full control of access and egress.

Groundwater: Water within the earth that supplies wells and springs.

Groundwater Basin: Subsurface structure having the character of a basin with respect to collection, retention and outflow of water.

Groundwater Recharge: Absorption and addition of water to the zone of saturation.

Habitat: A place where a plant or animal naturally or normally lives and grows.

Heavy Metals: A metal (e.g., lead, mercury, cadmium, and chromium) of atomic weight greater than sodium (a.w. - 22.9 grams/molecule) that forms soaps on reaction with fatty acids.

Hydraulic Gradient: The rate of change in total head per unit of distance of flow in a given direction.

Hydraulic Retention Time: The period of time that a liquid remains in a vessel, basin or container (in this case, a lake or reservoir).

Hydrocarbons (HC): Any of a vast family of compounds containing hydrogen and carbon. Used loosely to include many organic compounds in various combinations; most fossil fuels are composed predominantly of hydrocarbons. When hydrocarbons mix with nitrogen oxides in the presence of sunlight, ozone is formed; hydrocarbons in the atmosphere contribute to the formation of ozone.

Impacts: An assessment of the meaning of changes in all attributes being studied for a given resource; an aggregation of all the adverse effects, usually measured using a qualitative and nominally subjective technique. In this EIS, as well as in the CEQ regulations, the word impact is used synonymously with the work effect.

Impoundments: Surface water reservoir.

Infiltration and Inflow: The act of stormwater entering the degraded sections of a sanitary sewer collector system made of clay/tile.

Infrastructure: The basic installations and facilities on which the continuance and growth of a community, state, etc., depend; e.g., roads, schools, power plants, transportation and communication systems, etc.

Interdisciplinary Team (ID Team): A group of individuals with different training assembled to solve a problem or perform a task. The team is assembled out of recognition that no one scientific discipline is sufficiently broad to adequately solve the problem. Through interaction, participants bring different points of view to bear on the problem.

Lead (Pb): A heavy metal used in many industries, which can accumulate in the body and cause a variety of negative effects. One of the six pollutants for which there is a national ambient air quality standard. See Criteria Pollutants.

Long-Term Effects: Those effects which generally occur after the maximum 15-year life of the Forest Plan.

Management Area: An aggregation of capability areas which have common management direction and may be noncontiguous in the Forest. Consists of grouping of capability areas selected through evaluation procedures and used to locate decisions and resolve issues and concerns.

Mineral: Naturally occurring inorganic element or compound.

Mitigation: A method or action or series of actions proposed to reduce or eliminate adverse environmental effects.

National Environmental Policy Act (NEPA): An act which encourages productive and enjoyable harmony between man and his environment; promotes efforts to prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; enriches the understanding of the ecological systems and natural resources important to the Nation; and establishes a Council on Environmental Quality.

National Forest Management Act (NFMA): A law passed in 1976 as amendments to the Forest and Rangeland Renewable Resources Planning Act that requires the preparation of Regional and Forest Plans and the preparation of regulations to guide that development.

National Forest System: All national Forest lands reserved or withdrawn from the public domain of the United States; All national forest lands and national grasslands acquired through purchase, exchange, donation, or other means.

Native Americans: Used in a collective sense to refer to individuals, bands or tribes who trace their ancestry to indigenous populations of North America prior to Euro-American contact.

Native Vegetation: Plant life that occurs naturally in an area without agricultural or cultivational efforts. It does not include species that have been introduced from other geographical areas and become naturalized.

Nitrogen Dioxide (NO₂): Gas formed primarily from atmospheric nitrogen and oxygen when combustion takes place at high temperature. NO₂ emissions contribute to acid deposition and formation of atmosphere ozone. One of the six pollutants for which there is a national ambient standard. See Criteria Pollutants.

Nitrogen Oxides (NO_x): Gases formed primarily by fuel combustion, which contribute to the formation of acid rain. Hydrocarbons and nitrogen oxides combine in the presence of sunlight to form ozone, a major constituent of smog.

Noise: Any sound that is undesirable because it interferes with speech and hearing, or is intense enough to damage hearing, or is otherwise annoying (unwanted sound).

Nonattainment Area: An area that has been designated by the USEPA or the appropriate state air quality agency, as exceeding one or more National or State Ambient Air Quality Standards.

Overstory: The portion of the trees that form the uppermost canopy layer in a forest of more than one story.

Ozone (ground level): A major ingredient of smog. Ozone is produced from reactions of hydrocarbons and nitrogen oxides in the presence of sunlight and heat. Some 68 areas, mostly metropolitan areas, did not meet a December 31, 1987 deadline in the Clean Air Act for attaining the ambient air quality standard for ozone.

pH: pH is a value to represent the acidity or alkalinity of an aqueous solution.

Peak Season-Peak Hour Traffic: The number of vehicles that pass a given point on a highway facility during the highest traffic hour of an average day during the peak tourist season.

Potable Water: Suitable for drinking.

Primary Roads: A consolidated system of connected main roads important to regional, statewide, and interstate travel; they consist of rural arterial routes and their extensions into and through urban areas of 5,000 or more population.

Recreation Opportunity Spectrum (ROS): Provides a framework for stratifying and defining classes of outdoor recreation environments, activities and experience opportunities. The settings, activities and opportunities for obtaining experiences have been arranged along a continuum or spectrum divided into six classes as follows:

U-	Urban
R -	Rural
RN-	Roaded Natural
M -	Modified
SPM-	Semi-Primitive Motorized
SPNM-	Semi-Primitive Non-Motorized
P-	Primitive

Recreation Visitor Days: Maximum number of visitor days possible.

Regional Roads: Major roadways that are capable of carrying traffic between areas in the region.

Roadless Area: Undeveloped Federal land within which there are no improved roads or roads maintained for travel by means of motorized vehicles intended for highway use.

Roadway Capacity: The maximum rate of flow at which vehicles can be reasonably expected to traverse a point or uniform segment of a lane or roadway during a specified time period under prevailing roadway, traffic and control conditions.

Scoping: The process for determining the scope of the issues to be addressed and for identifying the significant issues related to a proposed action.

Sediment: Solid material, both mineral and organic, that is in suspension, being transported, or has been moved from its site of origin by air, water, gravity or ice.

Sensitive Species: Those plant and animal species identified by the Regional Forester for which population viability is a concern. These species may be susceptible of vulnerable to activity impacts or habitat alterations, which may cause downward trends in habitat capability, population and/or distribution.

Siltation: The process of accumulating silt (particles finer than fine sand and coarser than clay); the result of silting (of a reservoir, in this case). "Silting" is more common.

Sluicing: To flood or drench by means of a sluice; to wash with a sudden flow of water; to flush.

Sulfur Dioxide (SO₂): A toxic gas that is produced when fossil fuels, such as coal and oil, are burned. SO₂ is the main pollutant involved in the formation of acid rain. SO₂ also can irritate the upper respiratory tract and cause lung damage. During 1980, some 27 million tons of sulfur dioxide were emitted in the U.S., according to the Office of Technology Assessment. The major source of SO₂ in the U.S. is coal-burning electric utilities.

Threatened Species: Any species, plant or animal, likely to become an endangered species within the foreseeable future throughout all, or a significant portion of its range. Threatened species are identified by the Secretary of the Interior in accordance with the 1973 Endangered Species Act.

Total Suspended Particulates (TSP): The particulate matter in the ambient air. The previous national ambient air quality standard for particulates was based on TSP levels; it was replaced in 1987 by an ambient standard based on PM₁₀ levels.

Turbidity: The measure of (concentration of) sediment or foreign particles stirred up or suspended; muddiness; cloudiness.

Understory: The trees and other woody plants growing under a more or less continuous cover of branches and foliage formed collectively by the upper portion of adjacent trees and other woody growth.

Viewshed: A total landscape as seen from a particular viewpoint.

Visual Quality Objective (VQO): A desired level of scenic quality and diversity of natural features based on physical and sociological characteristics of an area. Refers to the degree of acceptable alterations of the characteristic landscape.

Preservation - A Visual Quality Objective that provides for ecological change only.

Retention - A Visual Quality Objective which in general means man's activities are not evident to the casual forest visitor.

Partial Retention - A Visual Quality Objective which in general means man's activities may be evident but must remain subordinate to the characteristic landscape.

Modification - A Visual Quality Objective meaning man's activity may dominate the characteristic landscape but must, at the same time, utilize naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in foreground or middleground.

Maximum Modification - A Visual Quality Objective meaning man's activity may dominate the characteristic landscape but should appear as a natural occurrence when viewed as background.

Enhancement - A short-term management alternative which is done with the express purpose of increasing positive visual variety where little variety now exists.

Visual Resource: The composite of basic terrain, geologic features, water features, vegetative patterns, and land use effects that typify a land unit and influence the visual appeal the unit may have for visitors.

Water Table: The surface between the unsaturated zone and the zone of saturation. A surface on which the fluid pressure in the pores of a porous medium is exactly atmospheric.

Wetlands: Areas that are inundated or saturated with surface or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted for life in saturated soil. This classification includes swamps, marshes, bogs and similar areas.

Sources:

Dictionary of Geological Terms, 3rd ed., 1984.

American Heritage Dictionary of the English Language, 1976.

Basic Environmental Technology, 1986.

NSFS List of Terms.

Federal Emergency Management Agency (FEMA), Region IV.

ACRONYMS/ABBREVIATIONS

AADT	Average annual daily traffic
AAQS	Ambient air quality standard
ACHP	Advisory Council on Historic Preservation
ACOG	Atlanta Committee for the Olympic Games
ADT	Average daily traffic
ADYN	Dynamic I-D flow model with dynamic tributaries
AIRS	Aerometric Information Retrieval System (EPA)
AQCR	Air quality control region
AQCR #207	Air quality control region Eastern Tennessee - Southwestern Virginia Interstate
ARPA	Archaeological Resources Protection Act
BMP	Best management practices
BP	Before Present
CAA	Clean Air Act
CAROG/SETDD	Chattanooga Area Regional Council of Government/Southeast Tennessee Development District
CEQ	Council on Environmental Quality
cfs	Cubic feet per second
CFR	Code of Federal Regulations
CNF	Cherokee National Forest
CO	Carbon monoxide
COD	Chemical oxygen demand
cy	Cubic yards
dB	Decibel
dBA	A-weighted sound level
DEIS	Draft environmental impact statement
DOT	Department of Transportation
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
EIFS	Economic Impact Forecast System
EIS	Environmental impact statement
EPA	U.S. Environmental Protection Agency
EPCFD	East Polk County Fire Department

F	Fahrenheit
FBI	Federal Bureau of Investigation
FBFM	Flood Boundary and Floodway Map
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FG	Foreground
FIRM	Flood Insurance Rate Map
FLRMP	Forest Land and Resource Management Plan
FS	Forest Service
FSM	Forest Service Manual
gpm	Gallons per minute
HABS/HAER	Historic American Buildings Survey/ Historic American Engineering Record
HC	Hydrocarbon
HPP	Historic Preservation Plan
I	Interstate
ICEAS	Intermittent Cycle Extended Aeration System
ICF	International Canoe Federation
ID Team	Interdisciplinary Team
IOC	International Olympic Committee
IRA	Integrated Resource Analysis
kg	kilogram
KOA	Kampgrounds of America
KW	Kilowatt
Kwh	Kilowatt hours
LF	Landfill
LOS	Level of service
MA	Management Area(s)
MCLG	Maximum Contaminant Level Goal
MG	Middle-ground
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
MIS	Management Indicator Species
MW	Megawatt
MGals	Million gallons

mgd	Million gallons per day
MOA	Memorandum of Agreement
MSL	Mean sea level
NAAQS	National Ambient Air Quality Standards or AAQS
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NFMA	National Forest Management Act
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NO ₂	Nitrogen dioxide
NO _x	Nitrogen oxides
NRHP	National Register of Historic Places
NSR	New source review
NWI	National Wetland Inventory
NWPS	National Wilderness Preservation System
NYS DEC	New York State Department of Environmental Conservation
O ₃	Ozone
ORM	Ocoee River mile
Pb	Lead
PCRPC	Polk County Regional Planning Commission
PM-10	Particulate matter with an aerodynamic diameter less than or equal to 10 micrometers
ppm	Parts per million
ppmv	Part per million by volume
RAM	Resource assessment matrix
RCW	Red cockaded woodpecker
RD	Ranger District(s)
RFDS	Reasonable Foreseeable Development Scenario
ROD	Record of Decision
ROG	Reactive organic gas
ROI	Region of influence
ROS	Recreation Opportunity Spectrum
RTV	Rational threshold values
RVD	Recreation visitor days
SCS	Soil Conservation Service (USDA)

SF	Square feet
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SO ₂	Sulfur dioxide
SO _x	Sulfur oxides
TBI	Tennessee Bureau of Investigation
TDEC	Tennessee Department of Environment & Conservation
TDOT	Tennessee Department of Transportation
TDHE	Tennessee Department of Health and Environment
TES	Threatened and Endangered Species
Tons/Mi ² /year	Tons per square mile per year
TSP	Total suspended particulates
TVA	Tennessee Valley Authority
TWRA	Tennessee Wildlife Resources Agency
µg/l	Microgram per liter
µg/m ³	Microgram per cubic meter
USCKT	U.S. Canoe and Kayak Team
USDA	United States Department of Agriculture
USDA-FS	United States Department of Agriculture - Forest Service
US DOT	United States Department of Transportation
USGS	U.S. Geological Survey
VIP	Very important person
VMS	Visual Management System (used by Forest Service)
VOC	Volatile organic compound
VQO	Visual Quality Objective
WDM	Wetland Delineation Manual
WPCFD	West Polk County Fire Department

APPENDIX F NOTICE OF INTENT

[3410-11]

DEPARTMENT OF AGRICULTURE

Forest Service

1996 Olympic Whitewater Slalom Course Construction, Ocoee River Whitewater Venue, Ocoee Ranger District, Cherokee National Forest, Polk County, Tennessee.

AGENCY: Forest Service, USDA

ACTION: Notice of Intent to Prepare an Environmental Impact Statement

SUMMARY: The Forest Service will prepare, using a contractor, an environmental impact statement on a proposed action to authorize the development and operation of a canoe/kayak whitewater slalom course and the associated visitor and administrative facilities in and along the Ocoee River and to authorize the use of these facilities for Olympic and pre-Olympic events in connection with the 1996 summer games.

The Forest Service, Tennessee Valley Authority, and State of Tennessee jointly manage recreational use on sections of the Ocoee River. The proposed site is on lands administered by the Cherokee National Forest, Tennessee. Therefore, the Forest Service is the lead agency and is responsible for the preparation of the environmental impact statement. The Tennessee Valley Authority, the Tennessee Department of Environment and Conservation, and the Tennessee State Planning Office will participate as cooperating agencies in the environmental analysis.

The Forest Service invites comments on the scope of the environmental analysis for the EIS. In addition, the agency gives notice of the environmental analysis and decision making process that will occur on the proposal so that interested and affected people are aware of how they may participate and contribute to the decision.

DATE: Comments should be received by August 1, 1992, to ensure timely consideration.

ADDRESS: Send written comments to Olympics Coordinator, Cherokee National Forest, P.O. Box 2010, Cleveland, TN 37320.

FOR FURTHER INFORMATION CONTACT: Reese Scull, Recreation Staff Officer, (615) 476-9700.

SUPPLEMENTARY INFORMATION: In 1989 the U.S. Canoe and Kayak Team (USCKT), through the Atlanta Center for Excellence, provided the Atlanta Organizing Committee with a proposal to use the Ocoee River as the 1996 site for whitewater races. The Ocoee River was preferred by the USCKT over other southeastern rivers because of its proximity to Atlanta, ability to regulate water flows, and its history as a competitive whitewater site. The final bid package that was accepted in 1990 by the International Olympic Committee (IOC) in Tokyo stated that "If the IOC chooses to include wildwater canoeing in the program, the organizing committee is prepared to stage the competition on the Ocoee River..." Inclusion of the whitewater event in the 1996 games will be determined this year. The Atlanta Committee for the Olympic Games (ACOG) will make its recommendation to the IOC in May, and the IOC will make its decision in July 1992.

The State of Tennessee was invited to sponsor the event, and in 1991 conducted a feasibility study concerning the potential for successfully hosting Olympic events on the Ocoee River. In addition to the cost/benefit information, two site locations on the Ocoee River were explored: the lower Ocoee gorge, site of current whitewater use; and the upper Ocoee river. Public involvement during this period led the USCKT to identify the upper river site as the preferred site location. Among the reasons contributing to this preference were less traffic congestion, ability to locate most of the facilities above the floodplain, and less impact on existing commercial and recreational whitewater use. It is this site that will be studied in this environmental analysis.

Upon completion of the feasibility study, the State of Tennessee, acting as sponsor of the event, submitted a proposal to the Forest Service for an authorization to allow Olympic whitewater slalom events to be conducted on National Forest System land. The events are scheduled to be held during a three day period from July 26, 1996, through July 28, 1996. An estimated 25,000 spectators are expected to attend the events. In 1995, the International Slalom Competition would be held on the Ocoee River on July 29-30. This pre-Olympic competition is estimated to draw 13,000 spectators.

The Forest Service proposed action is based on recommendations of the USCKT and conceptual designs of the Olympic whitewater site developed for the State of Tennessee. The whitewater course would be proposed for a 400 meter-long section of the Ocoee River between Tennessee Valley Authority Dam Number 3 and Dam Number 2. The

proposed whitewater course would be located 1.1 river miles above Power House Number 3. Proposed construction of permanent facilities needed for this event include the whitewater course itself to increase water velocity in that section of the river used for competition, plus associated facilities including start and finish points, judging platforms, footbridges over the channel, and administration and visitor services buildings. Much of the Olympic village and spectator seating in the proposed action may be temporary, and removed after 1996. Housing for athletes will be located off-site.

The decision to be made following the environmental analysis is whether or not the Forest Service will authorize the development and operation of a whitewater slalom course and associated facilities for the 1996 Olympic summer games and associated pre-Olympic events on the Ocoee River and under what conditions such use would be authorized. In addition, other decisions involving any required permits or licenses necessary for this event and associated facilities and their operation may be made as a result of this analysis.

A preliminary public involvement meeting was conducted by the State of Tennessee on December 18, 1991, in Cleveland, Tennessee. Groups and individuals representing public and private sector interests in the Ocoee River were invited to review the findings of the feasibility study, and help identify issues surrounding the event and the proposed location. The following preliminary issues, related to development of the Ocoee River, have been identified:

- (1) Effects on present river outfitters and guides;

- (2) Effects on fish and wildlife habitat including threatened and endangered plant and animal species;
- (3) Effects on existing roads (US Highway 64);
- (4) Effect on public safety on US Highway 64;
- (5) Effect on water quality and stream channel stability;
- (6) Effects on visual resources from construction of buildings and associated facilities;
- (7) Effects on availability of water for power generation;
- (8) Effects on the local economy;
- (9) Effects on existing recreation activities along and within the river;
- (10) Effects on cultural resources;
- (11) Long term effects of maintaining a whitewater course;
- (12) Effects of facilities construction within the floodplain of the Ocoee River.

In preparing the environmental impact statement, a range of alternatives will be considered to meet the purpose and need for the proposed action. They will include as a minimum, the proposed action, the no action alternative, and an alternative that would result in the removal of all facilities following the 1996 Olympics. Additional alternatives may be developed to address significant issues received during the scoping process. The EIS will disclose the direct, indirect, and cumulative effects of implementing each of the alternatives.

Some of the proposed facilities lie within the floodplain of the Ocoee River. Consonant with Executive Order 11988, Floodplain

Management Guidelines, the environmental impact statement will analyze and disclose impacts to floodplains and the potential effects of facility construction within the Ocoee River floodplain.

Public participation will be especially important at several points during the analysis process. The first point in the analysis is the scoping process (40 CFR 1501.7). The scoping process includes, but is not limited to:

- (1) identifying potential issues,
- (2) identifying issues to be analyzed in depth,
- (3) eliminating insignificant issues or those which have been covered by a relevant previous environmental analysis,
- (4) exploring additional alternatives, and
- (5) identifying potential environmental effects (i.e., direct, indirect, and cumulative) of the alternatives.

The Forest Service is seeking information, comments, and assistance from Federal, State and local agencies, and other individuals or organizations who may be interested in or affected by the proposal. This information will be used in the preparation of the draft environmental impact statement. Notification letters will be sent to all known interested and/or affected parties and the media to solicit public participation.

Workshops will be held to provide information and to gather issues and concerns from the public on the proposed action. When the dates and locations of workshops have been determined, this information will be made known through local media, direct contact with known interested publics, and direct mailings.

The draft environmental impact statement is expected to be filed with the Environmental Protection Agency (EPA) and to be available for public review by March 1993. At that time, EPA will publish a notice of availability of the draft environmental impact statement in the Federal Register.

The comment period on the draft environmental impact statement will be 45 days from the date the Environmental Protection Agency publishes the notice of availability in the Federal Register.

The Forest Service believes, at this early stage, it is important to give reviewers notice of several court rulings related to public participation in the environmental review process. Upon release of the draft environmental impact statement, projected for March 1993, reviewers must structure their participation in the environmental review of the proposal so that it is meaningful and alerts an agency to the reviewer's position and contentions. Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 553 (1978). Also, environmental objections that could be raised at the draft environmental impact statement stage but that are not raised until after completion of the final environmental impact statement may be waived or dismissed by the courts. City of Angoon v. Hodel, 803 F.2d 1016, 1022 (9th Cir. 1986) and Wisconsin Heritages, Inc. v. Harris, 490 F. Supp. 1334, 1338 (E.D. Wis. 1980). Because of these court rulings, it is very important that those interested in this proposal participate by the close of the 45-day comment period so that substantive comments and objections are made available to the Forest Service at a time when it can

meaningfully consider them and respond to them in the final environmental impact statement.

To assist the Forest Service in identifying and considering issues and concerns on the proposed action, comments on the draft environmental impact statement should be as specific as possible. It is also helpful if comments refer to specific pages or chapters of the draft statement. Comments may also address the adequacy of the draft environmental impact statement or the merits of the alternatives formulated and discussed in the statement. (Reviewers may wish to refer to the Council on Environmental Quality Regulations for implementing the procedural provisions of the National Environmental Policy Act at 40 CFR 1503.3 in addressing these points.)

After the comment period ends on the draft environmental impact statement, the comments will be analyzed, considered, and responded to by Agencies in preparing the final environmental impact statement. The final environmental impact statement is scheduled to be completed by September 1993.

The responsible official will consider the comments, responses, and environmental consequences disclosed in the final environmental impact statement, and applicable laws, regulations, and policies in making a decision regarding this proposal. The responsible official will document the decision made and reasons for the decision in a Record of Decision.

The responsible official is John F. Ramey, Forest Supervisor,
Cherokee National Forest, P.O. Box 2010, Cleveland, TN 37320.

/S/JOHN F. RAMEY

May 22, 1992

JOHN F. RAMEY

Date

Forest Supervisor

G-1
OLYMPIC PROGRAM REQUIREMENTS

Program Requirements -- Atlanta Committee for Olympic Games -- Ocoee River Whitewater Slalom Venue

FUNCTION	SIZE	DESCRIPTION	LOCATION	COMMENTS
Host Broadcast				
Broadcast Compound	20,000 sf	Fenced exterior compound for trailers, portable facilities and temporary structures.	River left. Inconspicuous to spectators and cameras. Screen with vegetation. Center on course if possible.	Compound layout supplied by ACOG.
TV camera platforms	900 sf	Level spaces adjacent to course for TV cameras.	Most on river left. One on river right. Must be adjacent to course with no line of sight interruptions.	Total of six platforms with average size of 150 sf. Watch for clearance around booms.
TV commentator positions	1,350 sf	Tiered seats with tables for 3 persons, with TV monitor and commentator support system terminals.	River left at finish line. Must be adjacent to course with no line of sight interruptions. Within 500' of media compound.	30 positions at 45 sf each. Sun and rain protection. Provide 200 sf equipment shack.
TV observer positions	180 sf	Tiered seats without tables.	River left at finish line, adjacent to TV commentator positions. Must be adjacent to course with no line of sight interruptions.	18 positions at 10 sf each. Sun and rain protection. For unilateral media officials.
Service staff parking	6,000 sf	Paved or gravel parking spaces.	River right adjacent to VIP/service building.	20 spaces at 300 sf each.
Tractor parking	1,000 sf	Paved or gravel parking spaces.	Can be off-site as long as they are "reasonably accessible," such as Boyd Gap.	For 18-wheel tractor units. Some equipment stored in tractors.
Technology				
Telephone line termination	100 sf	Weather-tight termination point for cable or fiber-optics.	Terminates at VIP/service building. Originates in vicinity of Ducktown.	4-fiber optic cable provided by ACOG, buried in US64 r.o.w.
Radio distribution control	100 sf	Weather-tight room for hand-held radio distribution and charging on-site.	River left in a central area, or in or around VIP/service building.	Two or three 110 volt, 20 amp circuits.
Radio tower and support	100 sf	Radio tower for local radio, cellular telephone (C2 & C3) and microwave radio, and building for radio equipment.	River right on high hill, or on or around VIP/service building. Maximum 1/2 mile from site. Height to clear trees.	Assess power requirements.

Results hardware	350 sf	Weather-tight room with computer equipment.	River left at finish line.	Provides scoring function. Requires 200 sf storage.
Timing shack	200 sf	Weather-tight room with timing equipment.	River left at finish line.	Timing and scoring provided by different contractors.
Results input	100 sf	Weather-tight room with input terminals and computer equipment.	River left adjacent to or collocated with timing shack.	
Scoreboard operator	100 sf	Weather-tight room with scoreboard control equipment.	River left adjacent to timing shack.	
Results output and distribution	400 sf	Weather-tight room with printers and copiers.	River left adjacent to press and TV commentator positions.	Also serves team coaches with results information.
Public address announcer	100 sf	Commentator booth with public address equipment.	River right in place with good view of the entire course and of the scoreboards.	Provide 3 or 4 announcers with multi-lingual skills.
Video matrix board	400 sf	Trailer-mounted video matrix board.	River left near finish line and visible to most spectators on river right.	Provide by ACOG.
Matrix scoreboard	200 sf	Temporary scoreboard and clock, perhaps with generator.	River left near start line and visible to those spectators unable to see video matrix board.	
Tech support parking	1,500 sf	Paved or gravel parking spaces.	River right adjacent to VIP/service building.	5 spaces at 300 sf each.
Sports				
Boat put-in points	500 sf	Floating dock on river left. Natural (rock) feature on river right. Approx 25-30' long x 10' wide each.	River left near upper bridge. River right at pool above practice rapid.	Dock height 1' above design waterline. Restore Copper Road on river right to put-in.
Boat take-out points	2,000 sf	10' x 40' on river left. Ramped bottom. 20' x 80' on river right.	River left below lower bridge. River right below Blue Hole.	Blue Hole take-out suitable for rafting take-out purposes.
Start house	300 sf	For start timing equipment and start official.	River left at course start.	
Field of play (competitive channel)	150,000 sf	Approx. 600 meters long x 25 meters wide.	Within existing streambed, beginning below Blue Hole, linking major hydraulic features in river.	Actual course length and configuration to be determined by Olympic course designers.
Section judge stations	600 sf	Platforms with sun and rain protection. Electronically linked to scoring and communication systems.	River left, adjacent to course. Unobstructed view of course and gate judges within section.	6 stations, supporting 4 gates per station.
Gate judge stations	500 sf	Chair with umbrella.	River right and left at each gate location. Unobstructed view of course and section judge.	Two judges per gate. 10 sf per judge x 25 gates.

Awards platform	500 sf	Elevated exterior space for medalists to receive awards.	River left in central location visible to most spectators.	Provide photography zone in front of award platform -- approximately 500 sf.
Awards staging area	500 sf	Exterior area for staging awards ceremonies.	River left in convenient but inconspicuous or screened-off area near the awards platform.	Sun and rain protection.
Flagpoles	100 sf	Flagpoles for awards ceremonies.	River left in highly visible location (consider spectators, press and TV view angles).	3 flagpoles.
Athlete information office	150 sf	Area for posting notices, etc.	River left near or in athlete service area.	
Athlete changing rooms	800 sf	Locker rooms with toilets and showers for up to 150 athletes (75% male).	River left near or above start line but inconspicuous to spectators.	Use normal parameters for providing facilities.
Athlete lounge	2,500 sf	Area for relaxation and dining	River left near athlete changing rooms, with view of course.	Sun and rain protection only.
Athlete team tents	10,000 sf	Private day-use area for team members to confer, review tapes, etc.	River left near changing rooms, boat storage and lounge.	Fully enclosed structures @ 400 sf each x 25 teams.
Meditation area	200 sf	Quiet area for athlete meditation	River left near, but separate from, athlete changing rooms, etc.	
Officials' changing rooms	360 sf	Locker rooms with toilets and showers	River left near management offices	2 locker rooms with toilets, lavatories and showers per standard parameters
Officials' lounge	2,400 sf	Area for relaxation and dining	River left near management offices	80 people @ 30 sf each
Boat storage area	2,000 sf	Fenced exterior compound with tents and racks for boat and paddle storage	River left near put-in, visible from athlete lounge area.	200 boats maximum
Boat repair area	1,000 sf	Fenced exterior compound with tents	River left adjacent to boat storage area	Power for hand tools; 20 amp service per tent (200 amp svc)
Sports medicine area	600 sf	Room for therapeutic massage, chiropractic care, etc.	River left near athlete changing rooms	
Management				
ACOG management offices	7,000 sf	Office spaces for various management functions	River left in central location	Some functions may be fulfilled in permanent service building, if included
Technical officials' offices	1,000 sf	Office and meeting rooms for technical officials	River left adjacent to ACOG management offices	

Federation & VIP Services					
ICF offices	1,250 sf	Office spaces for various International Canoe Federation staff	River right in VIP/service building		
VIP hospitality	2,500 sf	Hosting areas for Olympic family and VIP's, including food service and restroom facilities	River right in VIP/service building		Mix of interior/exterior space for approximately 400 people
VIP seating	6,000 sf	Terraced viewing area overlooking course (cabana-style ?)	Adjacent to VIP hospitality area		Seating for approximately 600 people
Spectator Services					
Spectator seating	90,000 sf	Stadium-style seating in temporary bleacher structures	River right between start and finish lines, allowing official access space between seating and channel.		15,000 seats at 6 sf each. Consider sun protection.
Concessions	7,500 sf	Novelty and souvenir sales stands	River right behind spectator seating		One point of sale at 150 sf per 300 seats
Food service	6,000 sf	Food courts with limited seating and shade structures	River right behind spectator seating		Four points of sale at 1,500 sf each
Public restrooms	2,800 sf	Temporary self-contained restrooms in trailer units	River right behind spectator seating		Base actual need on normal sports parameters. Estimate 3 trailer units for men, 4 for women; 400 sf each.
Public information booths	600 sf	Public information and translation booths	River right behind spectator seating		Three booths at 200 sf each
Cultural Olympiad	6,000 sf	Displays of visual and performing arts of the southern Appalachians	River right behind spectator seating		Six featured exhibits @ 1,000 sf each
Operations					
Accreditation office	250 sf	Closed office space for adjustment of accreditations	River right in public access areas. Main unit near VIP/athlete entry. Satellite unit near ticketing/lower bridge.		On perimeter of venue security line, accessible from interior and exterior of venue.
Staff and contractor entry	300 sf		At lower bridge leading to mgmt offices		
Staff check-in office	200 sf		At lower bridge leading to mgmt offices		
Olympic family & VIP entry	300 sf		At VIP/service building		
Media entry	300 sf		At lower bridge leading to mgmt offices and media observer areas		

Public entry	15,000 sf	Public entry gates and queuing areas	River right on easts and west sides of site	Two entries with bus turn arounds (primary entry on west portal)
Ticket office	200 sf	Collect and hold tickets from ticket booths; resolve problems	River right at public entries	
Ticket booths	300 sf	Collect tickets from spectators	River right at bus drop-off point(s)	Six at 50 sf each
Bus queuing area	120,000 sf	Parking area for shuttle buses between arrival and departure periods	Closed lane(s) of US64 west of site	No idling of motors allowed
Bus driver rest area	3,000 sf	Area for drivers to relax between arrival and departure schedules	Adjacent to bus queuing area; outside venue	
Dispatcher station	800 sf	Area to schedule and direct limos, vans and buses for VIPs, athletes, officials and spectators	In direct contact with ACOG mgmt, athlete services, VIPs, and public entry gate(s)	
Material acquisition and distribution	2,200 sf	Storage space/logistics	Mostly river left	
Waste collection and disposal	1,500 sf	Solid waste (trash)	Mostly river right	Night time service
Media operation				
Interview room	1,800 sf	For interviewing athletes and officials	River left; close to press/TV facilities	
Media lounge	2,400 sf	For relaxation and dining	River left; close to press/TV facilities	
Media work room	1,800 sf	For preparing and transmitting press releases	River left; close to press/TV facilities	Provide multiple phone lines, workstations, fax machines, live TV feed, data banks, etc
Photo lab	400 sf	For on-site processing of press photography	River left, close to press/TV facilities	Provided by self-contained trailer unit
Mixed zone	1,000 sf	Exterior area for press interaction with athletes	River left at finish line	Provide opportunity for athlete to accept of decline interviews
Boat Control	800 sf	Area to weigh and measure boats and equipment	River left adjacent to finish line	
Food service				
Athletes	1,200 sf	Area to serve midday meal	River left near athlete lounge	
Media	1,200 sf	Area to serve midday meal	River left near press/TV facilities	
Staff	1,200 sf	Area to serve midday meal	River left near ACOG management offices	
Medical services				
Doping control	600 sf	Area to test for presence of drugs	River left near finish line	

First aid - athletes	600 sf	Area for first response to medical needs	River left near athlete lounge/changing rooms	Provided by TN National Guard (?)
First aid - VIPs	600 sf	Area for first response to medical needs	River right at VIP/service building	Tn NG
First aid - spectators	600 sf	Area for first response to medical needs	River right behind spectator seating	TN NG
Ambulance parking	600 sf	Parking area(s) for ambulances for routine transport to hospital	River right near east and west entry portals	
Helipad	10,000 sf	Take-off/landing pad for medivac helicopter	River right - highway median (?)	TN National Guard Blackhawk Helicopter

G-2
AIR QUALITY

FUGITIVE DUST EMISSION CALCULATION

The following equation (AP-42 Chapter 11.2.1 Unpaved Roads) was used to estimate the quantity of size specific particulate emissions from an unpaved road, per vehicle mile traveled (VMT):

$$E = k(5.9)(s/12)(S/30)(W/3)^{0.7}(w/4)^{0.5}([365 - p]/365)$$

where:

F = emission factor, lb/VMT

k = particle size multiplier (dimensionless)

= 0.36 for PM-10 (particle size < or - to 10 micrometer [μm])

s = silt content of road surface material, %

= 28.5% for dirt rural roads

S = mean vehicle speed, mph

= assume 20 mph

W = mean vehicle weight, ton

15 cu yd load truck

truck load, lb - (15 cu yd) (100 lb dirt/cu ft) (27 cu ft/cu yd) = 40,500 lb

truck weight is 15,000 - 20,000 lb, so assume equal to 20,000 lb

total weight of empty truck - 20,000 lb = 10 tons

total weight of full truck = 60,500 lb = 30.25 tons

w = mean number of wheels

= assume 12

p = number of days with at least 0.254 mm (0.01 inch) of precipitation per year

= 120 (from AP-42 Figure 11.2.1-1)

$$E_{\text{empty truck}} = (0.36)(5.9)(28.5/12)(20/30)(10/3)^{0.7}(12/4)^{0.5}([365 - 120]/365)$$

$$E_{\text{empty truck}} = 9.08 \text{ lb/VMT}$$

and

$$E_{\text{full truck}} = (0.36)(5.9)(28.5/12)(20/30)(30.25/3)^{0.7}(12/4)^{0.5}([365 - 120]/365)$$

$$E_{\text{full truck}} = 19.71 \text{ lb/VMT}$$

Approximately 61,000 cu yd of fill would be removed by trucks having 15 cu yd capacity. The round trip distance traveled by one truck would be about 2,000 ft (or 0.378 mile); therefore, the VMT traveled by an empty truck is 0.189 mile, and the VMT traveled by a full truck in 0.189 mile. It would require 4,067 trucks to remove 61,000 cu yd at 15 cy yd per truck.

$$\text{Fugitive dust, ton} = [4,067 \text{ trucks}] * [(E_{\text{empty truck}} \text{ lb/VMT}) (0.189 \text{ VMT}) + (E_{\text{full truck}})(0.189 \text{ VMT})] * [1 \text{ ton}/2,000 \text{ lb}]$$

$$\text{Fugitive dust, ton} = (4,067 \text{ trucks}) * [(9.08 \text{ lb/VMT}) (0.189 \text{ VMT}) + (19.71 \text{ lb/VMT})(0.189 \text{ VMT})] * [1 \text{ ton}/2,000 \text{ lb}]$$

$$F, \text{ ton} = 11.06 \text{ ton}$$

The following information is provided for your reference:

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2. The second section contains a description of the items.

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G-3
TRAFFIC AND TRANSPORTATION

COMMENTS ON SHUTTLE PLAN

As stated previously, the proposed shuttle plan calls for 50 percent of the spectators (7,500 people) to be shuttled to the venue from each portal. It is assumed that all of the VIPs would be shuttled from the Cleveland area. If the spectators are travelling in groups of three, then approximately 2,500 lodging units would be needed in the vicinity of each portal for the spectators. The Cleveland-Chattanooga area has adequate lodging facilities to accommodate the spectators as well as the VIPs. However, some of the spectators will need to travel over 90 minutes from motels in the Chattanooga and Atlanta area to reach the Ducktown portal. This also assumes that the spectators are able to reserve nearly every room in the vicinity at an early date, or travel times would be longer. If campsites are also to be used for overnight lodging, this travel time would be reduced to 60 minutes or longer.

CAPACITY AND LEVEL OF SERVICE (LOS)

In a rural area, roadway capacity is determined by a number of different parameters, including design speed, lane and shoulder widths, passing opportunities, terrain, number of driveways accessing the road, and traffic characteristics, including percentage of trucks and heavy vehicles and directional split of the traffic. The amount of delay that a driver experiences on that road compared to free flow conditions defines the level of service (LOS) that the roadway exhibits. LOS is usually characterized by the letters A through F, with A representing a free-flowing facility and F representing bumper-to-bumper traffic congestion.

As the percentage of heavy vehicles (trucks, buses, and recreational vehicles) and directional distribution of traffic varied in a number of the analyses in the EIS, the capacity of the roadway segments of U.S. 64 also changed. The table shown below summarizes the hourly carrying capacity of each roadway link for each analysis year.

LOS E HOURLY CAPACITY

Analysis Year	U.S. 64 Sections			
	Cleveland to U.S. 411 ¹	U.S. 411 to 4-lane Section Near Venue ²	4-Lane Section Near Venue ³	3-Lane Section from Venue to Ducktown
1993	3440/3440	1330	2448/2448	2149
1994	3360/3400	1292	1292 ³	2208
1996-BB (Red Trucks)	3640/3640	1562	2844/2844	3522
1996-Alt #1	3000/3640	1231	1231 ³	3590
1996-Alt #2-3	3040/3640	1228	1228 ³	3590
2006	3400/3440	1271	2448/2448	2502

¹Capacities are for each direction (WB capacity/EB capacity)

²Capacities are both directions (two-way)

³Two of the four lanes on U.S. 64 near the venue will be used for bus parking. During construction, two of the four lanes would be used for construction equipment parking and truck parking. The remaining two lanes will be open for through traffic. Numbers separated by a slash in this column are capacities of each direction, single numbers represent two-way capacities.

TRAVEL TIME ANALYSIS FOR COMMUTING TO SHUTTLE POINTS IN CLEVELAND AND DUCKTOWN, TENNESSEE

An analysis of travel times from available accommodations in the area to the designated shuttle points for the Olympic Whitewater Slalom Venue at the Ocoee River near Ducktown, Tennessee was prepared. The shuttle points were designated by the Atlanta Committee for the Olympic Games (ACOG) as Cleveland, Tennessee, and Ducktown, Tennessee. The shuttle plan is to bring 50 percent of the attendees in from the east (Ducktown) and 50 percent in from the west (Cleveland). This document analyzes the available accommodations within various travel times of the two shuttle points to determine if the shuttle plan is reasonable.

Information gathered from AAA, Chambers of Commerce, Visitors Bureaus, Woodalls Campground Directory, and other available sources in an attempt to compile a comprehensive listing of all accommodations in the area. The enclosed table shows the results of this survey.

Cleveland, Tennessee has the greatest number of accommodations within a "short" commuting distance. Within a one hour driving time of Cleveland there are nearly 10,000 motel units and over 1,500 camping sites within a 1-hour commute. Ducktown has less than 800 motel units and 1,800 camp sites within the same driving time. Within a 2-hour commuting distance, Cleveland has nearly 19,000 motel units and 3,300 camp sites. Within that same distance, Ducktown has nearly 16,000 motel units and 8,300 camp sites. The large increase in available motel units for Ducktown in the 2-hour time range came from the Atlanta area. Commuting distance from Atlanta to Ducktown was a few minutes shorter than the distance from Atlanta to Cleveland, therefore, Ducktown "won" the Atlanta sites. It is important to note that each motel unit and campsite was assigned to only one shuttle point, that being the closest one.

If it is felt that a 4-hour, 2-way commute is reasonable to expect a spectator of the event to endure, then it is reasonable to split the shuttling equally to both Cleveland and Ducktown (it should be noted that traffic congestion on the days of the event will further increase this travel time). It is desirable to reduce the bus traffic on U.S. 64 west of the venue due to the restricted geometrics of the roadway, particularly in Ocoee Gorge, but the availability of accommodations makes this very difficult. Parking availability in the vicinity of Ducktown is another restriction. Clearly, this is a problem that has no easy solutions.

**ACCOMMODATIONS WITHIN 150 MINUTES DRIVING DISTANCE
OF SHUTTLE POINTS**

Time	Accommodations			
	Cleveland		Ducktown	
	Motel Units	Camp Sites	Motel Units	Camp Sites
<15 minutes	1,438	87	46	8
15-30 minutes	6,000	1,085	463	288
30-60 minutes	2,353	400	252	1,533
60-90 minutes	1,759	972	1,713	4,684
90-120 minutes	7,098	779	13,327	1,674
120-150 minutes			7,084	2,900

Methodology: Information on hotels and campgrounds were collected from AAA, Woodalls Campground Directory, Chambers of Commerce, Visitors Bureau, etc. and compiled on worksheets by community within a reasonable commuting distance of Cleveland and Ducktown, Tennessee. A reasonable effort was made to include all communities containing accommodations within the commuting area and to include all listed accommodations within each of those communities using the sources stated above. Commuting distances were calculated based on distance and reasonable speeds for various types of roadways. Communities and the accommodations within those communities were then categorized based on driving distances to the CLOSEST SHUTTLE POINT, either Cleveland or Ducktown. Each hotel unit or campsite only appears once in the table, even if the travel times were close to the same. For instance, travel time from Atlanta to Ducktown was only a few minutes shorter than travel time to Cleveland, but all of the accommodations in the northern part of Atlanta were included in the Ducktown portion of the table.

G-4
SOCIOECONOMICS

Total Population, Ocoee ROI, 1969-1989

YEAR	Population	Change	Deviation	Percent Deviation
1969	90,500	na	na	na
1970	92,600	2,100	255	0.282
1971	95,700	3,100	1,255	1.355
1972	98,000	2,300	455	0.475
1973	100,600	2,600	755	0.770
1974	102,600	2,000	155	0.154
1975	104,200	1,600	-245	-0.239
1976	106,700	2,500	655	0.629
1977	108,900	2,200	355	0.333
1978	110,900	2,000	155	0.142
1979	113,100	2,200	355	0.320
1980	115,100	2,000	155	0.137
1981	116,300	1,200	-645	-0.560
1982	116,800	500	-1,345	-1.156
1983	117,600	800	-1,045	-0.895
1984	119,500	1,900	55	0.047
1985	121,100	1,600	-245	-0.205
1986	122,400	1,300	-545	-0.450
1987	124,000	1,600	-245	-0.200
1988	125,800	1,800	-45	-0.036
1989	127,400	1,600	-245	-0.195

Source: U.S. Army Corps of Engineers, Economic Impact Forecast System, 1992.

Note: Standard deviation provides a comparison of population change in various years, allowing unlike numbers to become comparable. The most significant annual population change is represented by the highest deviation.

Regional Employment, Ocoee ROI, 1969-1989

YEAR	Employment	Change	Deviation	Percent Deviation
1969	37,019	na ^(a)	na	na
1970	37,405	386	703	1.899
1971	38,497	1,092	3	0.008
1972	41,813	3,316	2,227	5.785
1973	44,395	2,582	1,493	3.571
1974	42,903	1,492	2,581	5.813
1975	40,135	2,768	3,857	8.990
1976	42,432	2,297	1,208	3.010
1977	43,717	1,285	196	0.462
1978	46,088	2,371	1,282	2.933
1979	47,302	1,214	125	0.272
1980	47,561	259	830	1.754
1981	47,997	436	653	1.373
1982	47,711	286	1,375	2.864
1983	48,899	1,188	99	0.208
1984	51,435	2,536	1,447	2.959
1985	52,218	783	306	0.595
1986	53,708	1,490	401	0.768
1987	56,469	2,761	1,672	3.113
1988	57,913	1,444	355	0.629
1989	58,796	883	206	0.355

^a Not applicable.

Source: U.S. Army Corps of Engineers, Economic Impact Forecast System, 1992.

Total Personal Income, Ocoee ROI, 1969-1989

YEAR	Personal Income	Adjusted Income	Change	Deviation	Percent Deviation
1969	\$238,861	\$628,582	na ^(a)	na	na
1970	257,903	639,958	\$11,376	\$22,716	3.614
1971	286,997	683,326	43,368	9,276	1.450
1972	328,197	756,214	72,888	38,796	5.678
1973	380,234	824,803	68,588	34,496	4.562
1974	406,291	793,537	31,266	65,358	7.924
1975	437,310	782,308	11,229	45,321	5.711
1976	491,381	831,440	49,132	15,040	1.923
1977	533,998	848,963	17,523	16,569	1.993
1978	609,492	900,284	51,320	17,228	2.029
1979	691,161	916,659	16,375	17,717	1.968
1980	785,786	917,974	1,315	32,777	3.576
1981	869,549	921,132	3,158	30,934	3.370
1982	914,727	914,727	6,405	40,497	4.396
1983	1,010,600	980,213	65,486	31,394	3.432
1984	1,105,802	1,037,338	57,124	23,032	2.350
1985	1,191,220	1,079,004	41,666	7,574	0.730
1986	1,272,946	1,172,142	93,138	59,046	5.472
1987	1,393,746	1,238,885	66,744	32,651	2.786
1988	1,508,372	1,289,207	50,322	16,229	1.310
1989	\$1,606,578	\$1,310,423	\$21,216	\$12,876	0.999

^a Not applicable.

Notes: All dollar amounts are in thousands of dollars.

Dollar adjustment based on Consumer Price Index (1982 = 100).

Source: U.S. Army Corps of Engineers, Economic Impact Forecast System, 1992.

1
2

Business Volume as Indicated by Non-Farm Income
Ocoee ROI, 1969-1989

YEAR	Non-Farm Income	Adjusted Income	Change	Deviation	Percent Deviation
1969	\$187,347	\$493,018	na ^(a)	na	na
1970	199,895	496,017	\$2,999	-14,123	-2.865
1971	222,547	529,874	33,856	16,735	3.374
1972	257,247	592,735	62,861	45,739	8.632
1973	293,632	636,946	44,211	27,089	4.570
1974	302,605	591,025	-45,920	-63,042	-9.898
1975	309,775	554,159	-36,866	-53,988	-9.135
1976	354,652	600,088	45,929	28,807	5.198
1977	377,244	599,752	-336	-17,458	-2.909
1978	437,911	646,841	47,089	29,967	4.997
1979	489,998	649,865	3,024	-14,098	-2.179
1980	541,318	632,381	-17,484	-34,606	-5.325
1981	596,226	631,595	-786	-17,907	-2.832
1982	605,234	605,234	-26,361	-43,483	-6.885
1983	678,168	657,777	52,543	35,421	5.852
1984	735,092	689,580	31,803	14,681	2.232
1985	789,250	714,900	25,321	8,199	1.189
1986	834,630	768,536	53,636	36,514	5.108
1987	916,513	814,678	46,142	29,020	3.776
1988	968,856	828,082	13,404	-3,718	-0.456
1989	\$1,024,268	\$835,455	\$7,373	-9,749	-1.177

^a Not applicable.

Notes: All dollar amounts are in thousands of dollars.
Dollar adjustment based on Consumer Price Index (1982 = 100).

Source: U.S. Army Corps of Engineers, Economic Impact Forecast System, 1992.

ECONOMIC IMPACT FORECAST SYSTEM (EIFS) II: USER'S MANUAL, UPDATED EDITION

1 INTRODUCTION

Background

Following the passage of the National Environmental Policy Act (NEPA) in 1969¹, two orders established that all Federal agencies must assess the environmental impacts of their major programs and actions as well as provide leadership in environmental protection.² Because of NEPA's requirement for assessing any impacts on the "quality of human environment," subsequent questions arose regarding whether this mandate extends to the social and economic impacts of programs and actions. Many courts have decided that in preparing Environmental Impact Statements (EISs), adequate assessment of social and economic impacts is as important as assessment of biophysical impacts.

In the past, requirements such as the Case Study Justification Folder (CSJF) documentation for Department of the Army (DA) realignment actions provided for identifying potential economic impacts and considering these impacts in the decision-making process. More recently, Department of Defense (DOD) guidelines have encouraged a uniform approach to socioeconomic impact assessment, so that all DOD agencies may benefit from a systematic approach and uniform documentation. The desire for uniformity stems, in part, from the uniqueness and geographic distribution of DOD installations, their effects on local economies, and the complexity of problems associated with determining the social and economic implications of DOD realignment actions.

To address the need for a systematic approach to socioeconomic impact assessment DA, with substantial cooperation and support from the Department of the Air Force (USAF), has developed the Economic Impact Forecast System (EIFS), which provides information useful for calculating social and economic changes caused by DOD actions.³ This computer-aided system is designed to be a user-oriented, inexpensive, and systematic approach to meeting NEPA requirements. EIFS points out potentially significant problems early in the decision-making process so that alternatives may be considered. If no significant impacts are shown, adequate documentation of these impacts is still available.

Since the development of the original version of EIFS, the approach has been reviewed by members of the scientific community, including some of the nation's leading

¹National Environmental Policy Act of 1970, 83 Stat 852, 42USCS4321, et seq. (January 1970).

²Protection and Enhancement of Environmental Quality, Exec. Order 11514, 35 F.R. (March 5, 1970); Prevention, Control and Abatement of Environmental Pollution at Federal Facilities, Exec. Order 11752, 38 F. R. 34793 (December 19, 1973).

³R. Webster, R. Mitchell, R. Welsh, E. Shannon, and M. Anderson, The Economic Impact Forecast System: Description and User Instructions, Technical Report N-2/ADA027139 (U.S. Army Construction Engineering Research Laboratory (CERL), 1976); R. Webster, et al., The Rational Threshold Value (RTV) Technique for the Evaluation of Regional Economic Impacts, Special Report N-49/ADA055561 (CERL, 1978).

regional economists. Some modifications to the multiplier and other equations have been implemented to further refine the model. This report presents user instructions for this modified and updated version of the system. Information in this report supersedes information in CERL Technical Reports N-2 and N-69.⁴ Many problems identified by users in interpreting Technical Report N-69 and DA Pamphlet 200-2⁵ have also been alleviated in this updated report.

Objective

The Objective of this report is to provide instructions for using and interpreting output from the updated version of EIFS (EIFS II).

Approach

Experience obtained through assisting field users of EIFs was noted, and a plan for providing a more general user manual for EIFS II (free of limitation to any particular version) was devised. A user's manual was then prepared which meets the necessary criteria and explains in more detail how to use EIFS II in an interactive mode.

Mode of Technology Transfer

It is recommended that the information in this report be used in the revision of Department of the Army Pamphlet 200-2. Concurrent with this revision, it is recommended that existing computer system documentation of the EIFS model be altered to conform to EIFS II.

⁴J. W. Hamilton and R. D. Webster, Economic Impact Forecast System, Version 2.0: User's Manual, Technical Report N-69/ADA117661 (CERL, 1979).

⁵Economic Impact Forecast System: Description and User Instructions, DA Pamphlet 200-2 (Department of the Army, December 1976).

2 INTRODUCTION TO THE ECONOMIC IMPACT FORECAST SYSTEM

CERL developed EIFS to provide DA users with access to (1) selected Department of Commerce statistics regarding the socioeconomic characteristics of any multicounty area in the United States, and (2) a readily implemented analysis technique for assessing the magnitude and significance of potential socioeconomic impacts on those areas.⁶ Although EIFS was initially available for only a limited number of DA facilities, DA and USAF support gave impetus to its expansion to include all areas of the United States. Systematic improvement of the EIFS methodology has provided users with additional capabilities and refinements such as (1) a more realistic export employment multiplier,⁷ (2) tract-level socioeconomic data,⁸ and (3) the Rational Threshold Value (RTV) technique.⁹ Much of the work that constitutes EIFS II is contained in several of the new profiles of EIFS, Version 2.5. Because the format of EIFS II is similar to that used for the original version of EIFS, the acronym EIFS will continue to be used throughout this document.

EIFS acts as both an information source and as an analytical tool. The current database is obtained from a variety of sources: Census of Population, Census of Housing, Census of Manufacturers, Bureau of Economic Analysis (BEA) estimates, County Business Patterns (CBP) reports, and private marketing data firms.

A technique based primarily on the economic export base techniques¹⁰ is used to develop the necessary "multipliers." These multipliers are indicative of the total effect to be gained by adding new personnel or expenditures to a region. EIFS calculates and uses both employment and income multipliers to provide estimates of regional economic impacts.

The present EIFS system has evolved from the two-digit multiplier technique used originally to an improved four-digit multiplier. The original EIFS multipliers were based on the Bureau of Census classification of industries. Since the more aggregated approach would lead to an extreme overstatement of the multiplier, the next step in the EIFS development was to disaggregate the employment data. This was done by using the BEA County Business Patterns (CBP) computer tapes, which break employment down into the four-digit Standard Industrial Category (SIC) code.¹¹ The previous calculations had been done at an approximate two-digit level. This four-digit multiplier should more accurately reflect the actual situation, since the additional detail would be more apt to

⁶R. D. Webster, et al., Development of the Environmental Technical Information System, Interim Report E-52/ADA009668 (CERL, 1975); Technical Report N-2.

⁷Andrew Isserman, "Regional Employment Multiplier: A New Approach: Comment," Land Economics (August 1975); R. D. Webster, et al., Development of the Economic Impact Forecast System (EIFS)-The Multiplier Aspects, Technical Report N-35/ADA057936 (CERL, 1977).

⁸R. D. Webster and A.B. Moy, Tract Level Socioeconomic Data Systems for Solid Waste Management at Army Installations, Interim Report N-45/ADA054935 (CERL, 1978).

⁹R. D. Webster, et al., Special Report N-49.

¹⁰Charles M. Tiebout, The Community Economic Base Study, Supplemental Paper No. 16 (Committee for Economic Development, December 1962).

¹¹Standard Industrial Classification Manual, 1967 (Executive Office of the President, Bureau of the Budget, 1967).

catch small interindustry transactions. This four-digit multiplier is still an overstatement of the multiplier, although the actual or exact multiplier cannot be scientifically validated. Table 1 shows the effect of disaggregation.

Table 2 indicates the use of the "location quotient" technique for identifying the number of employees producing goods for export and also indicates the simplicity of the multiplier calculation for a very simple four-sector economic region. The actual technique in EIFS, of course, uses between 300 and 800 sectors.

Column 1 of Table 2 gives the percentage of the total national employment that each industry provides, Column 2 provides the total employment in the region for each industry, and Column 3 calculates the percentage of total regional employment that each industry contains. Location quotients are derived by dividing the items in column 3 by those in column 1. A location quotient greater than 1.00 indicates that the region exports those commodities to other regions. Location quotients less than 1.00 imply that the commodities are not produced locally in quantities sufficient to satisfy local needs and therefore must be imported. Finally, location quotients equal to 1.00 indicate that the region neither imports nor exports those commodities.

To find export employment in a basic industry, 1.00 is subtracted from the location quotient, and the answer divided by the original location quotient (Column 5). This answer gives the percentage of employment for the industry involved in export activity. Multiplying the items in column 5 by those in column 2 provides the number of export employees for each industry. The multiplier is the ratio of total regional employment to export employment. In this example, the multiplier is 5, indicating that a \$1 increase in export demand would cause a change of \$5 in regional income.

The size of the multiplier is directly related to the size of the region, the diversity of its industrial and commercial base, and the size of its population. The greater the population size, the more diverse is the region's economic base, and the more likely that purchased products are manufactured locally rather than imported. Therefore, money injected into the economy is "recycled" more often, causing greater changes in income.

Economic base analysis, with location quotients used as the technique for calculating multipliers, is at the heart of EIFS. CERL scientists believe that the advantages of this technique--reliance on published data sources, incorporation of indirect and direct exports, and the relative minimal cost involved--far outweigh its disadvantages.

Once the total effect is obtained, EIFS distributes the impact to various sectors of the regional economy.

1
2
3
4

TABLE 1
The Effects of Disaggregation
(From Andrew Isserman, "The Location Quotient Approach to Estimating
Regional Economic Impacts," *AIP Journal* [January 1977].)

Area	Division Level Data	Two-Digit Level Data	Three-Digit Level Data	Four-Digit Level Data
Georgia	19.01165	6.57299	5.49690	4.84118
Kansas	10.30828	6.51033	4.78054	4.29892
Philadelphia Standard Metropolitan Statistical Area (SMSA)	17.24355	9.10950	6.03754	5.18102
Washington, DC SMSA	3.30660	2.97354	2.81134	2.79792
Fort Monmouth Tri-County, NJ	15.68284	7.17098	5.18690	4.4776
Monmouth County, NJ	7.22016	5.16081	3.88481	3.49575

5
6

Employment data sources: County Business Patterns, 1972 augmented by data on government employment obtained from the Bureau of Economic Analysis, U.S. Department of Commerce.

TABLE 2
Location Quotients for a Hypothetical Region

Industry or Sector	1 Percent of National Employment	2 Regional Employment	3 Percent of Regional Employment	4 Location Quotient	5 LQ-1 + LQ	6 No. of Export Employees
Services	.40	400	.40	1.00	--	
Durable Goods Manufacturing	.20	75	.075	.375	--	
Nondurable Manufacturing	.10	25	.25	.25	--	
Trade	.30	500	.50	1.667	.40	200
Total		1,000				
Multiplier = $\frac{\text{Total Employment}}{\text{Basic Employment}} = \frac{1,000}{200} = 5$						

ESTIMATED REVENUE GENERATION ASSUMING NO GROWTH

Balance	\$5,590,000
TVA	\$2,800,000
Olympic operating	\$5,000,000
Post Olympic Operating cost	\$2,300,000
Put In & Take Out	\$800,000
Total Requirement	\$16,490,000

FEE	YEARS	USERS	
\$2.00	(1997-2000)	187,500	\$ 1,500,000
\$3.00	(2001-2008)	187,500	4,500,000
\$3.75	(2009-2021)	187,500	10,546,875

TOTAL REVENUE OVER 27 YEARS \$16,546,875

\$2.3 million operating cost will generate annuity amounts of \$12,100 per month @4.0%, \$145,600 annually.

Source: Tennessee Department of Environment and Conservation, 1992.

ESTIMATED REVENUE GENERATION ASSUMING NO GROWTH

Balance	\$5,590,000
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Post Olympic Operating cost	\$2,300,000
Put In & Take Out	\$800,000
Total Requirement	\$16,490,000

FEE	YEARS	USERS	
\$2.00	(1997-2000)	188,600	4 1,508,800
\$2.50	(2001-2008)	212,900	8 4,258,000
\$3.00	(2009-2021)	243,600	15 10,962,000

TOTAL REVENUE OVER 27 YEARS 16,728,800

\$2.3 million operating cost will generate annuity amounts of \$12,100 per month @4.0%, \$145,600 annually.

Source: Tennessee Department of Environment and Conservation, 1992.

Reported Estimates and Projections for Recreational Utilization of the Ocoee River

	Total Paying Cmcl	Total Commercial a	Total Users a
1984	53,728	65,280	75,659
1985	72,417	87,987	101,977
1986	81,624	99,173	114,942
1987	93,828	114,001	132,127
1988	100,065	122,052	143,917
1989	100,986	122,876	141,816
1990	107,868	130,044	153,415
1991	120,056	148,973	171,206
1992	134,198	167,553	189,796

Note: (a) Estimated for 1984-87, reported (actual) for 1988-92.

	Paying Commercial Customers			All Users		
	Low Projection	Middle Projection	High Projection	Low Projection	Middle Projection	High Projection
1993	136,472	140,231	143,990	192,178	197,471	202,765
1994	144,363	148,122	151,881	203,290	208,583	213,877
1995	152,034	155,793	159,552	214,092	219,385	224,679
1996	159,485	163,245	167,004	224,584	229,879	235,173
1997	177,960	181,719	185,478	250,601	255,894	261,187
1998	185,434	189,193	192,952	261,125	266,419	271,712
1999	192,674	196,433	200,192	271,321	276,614	281,907
2000	199,680	203,439	207,198	281,186	286,480	291,773
2001	206,451	210,210	213,969	290,721	296,015	301,308
2002	212,988	216,747	220,506	299,927	305,220	310,513
2003	219,291	223,050	226,809	308,802	314,096	319,389
2004	225,359	229,119	232,878	359,593	322,642	327,935
2005	231,194	234,953	238,712	325,564	330,857	336,151
2006	236,794	240,553	244,312	333,450	338,743	344,036

Source: Tennessee Department of Environment and Conservation, 1992
Tennessee Department of Finance and Administration, 1993
Harland Bartholomew and Associates, Inc., 1993

Ocoee Rafting Customers - Monthly Totals From State For Paying Customers of Outfitters Only, 1990, 1991, & 1992

#	March			April			May			June			July			August			September		
	1991	1992	1990	1991	1992	1990	1991	1992	1990	1991	1992	1990	1991	1992	1990	1991	1992	1990	1991	1992	
1	0	0	na	0	0	113	72	54	445	116	173	639	346	523	531	485	1,388	120	90	25	
2	0	10	2	20	56	218	189	326	271	421	510	984	1,236	1,112	1,269	1,624	1,749	666	558	466	
3	7	2	23	70	7	296	171	131	199	288	291	465	493	334	289	459	748	245	370	268	
4	0	0	na	91	34	42	195	316	450	467	633	654	613	1,017	449	681	1,205	330	399	473	
5	20	0	41	53	93	107	124	430	474	578	1,587	1,101	966	2,827	764	1,417	2,343	306	400	653	
6	38	11	73	142	277	562	633	587	1,696	1,622	1,621	2,315	1,903	3,065	2,243	3,214	3,899	1,596	1,472	1,654	
7	0	0	20	8	38	101	92	92	364	535	232	507	806	633	873	917	1,121	434	444	444	
8	39	69	165	262	323	250	1,206	1,267	2,347	2,890	2,413	3,594	3,816	4,568	4,300	5,105	4,850	1,740	1,933	1,802	
9	22	3	39	84	44	484	489	471	1,517	1,813	1,524	2,103	2,860	2,489	2,688	3,187	3,163	1,241	1,251	1,337	
10	27	10	113	293	185	1,105	896	868	2,053	2,258	1,589	4,351	3,753	3,836	3,857	4,452	5,497	2,846	2,246	1,714	
11	13	14	10	12	30	109	188	253	568	828	441	1,061	1,095	1,653	753	1,433	1,753	540	530	545	
12	10	0	6	0	0	93	34	0	259	207	0	327	460	0	345	527	344	282	422	167	
13	0	10	6	90	158	88	136	416	96	486	1,008	58	810	1,318	229	1,211	1,517	11	464	666	
14	0	0	na	25	0	na	87	139	338	24	380	411	454	694	460	474	847	252	249	255	
15	3	0	na	8	48	103	158	295	246	212	742	421	271	1,347	454	438	1,760	203	210	545	
16	0	0	23	8	21	40	106	28	418	554	30	641	1,033	374	861	1,331	316	445	516	180	
17	0	0	14	16	0	141	119	74	171	264	250	352	426	495	261	500	403	133	139	126	
18	0	2	na	11	37	na	0	98	25	236	196	408	293	314	284	426	492	219	279	302	
19	0	0	na	91	138	243	293	605	794	729	1,181	1,201	1,066	1,817	1,093	1,935	2,361	796	831	866	
20	10	10	80	264	191	657	665	900	2,227	1,943	1,660	3,574	3,523	3,916	3,247	4,340	3,967	1,736	1,612	1,591	
21	0	0	na	0	0	na	0	53	na	0	0	na	0	12	0	0	0	0	0	12	
22	0	0	22	0	0	186	0	37	588	0	9	813	633	399	997	805	857	538	55	243	
23	0	0	na	132	60	na	136	405	78	817	1,073	300	2,071	1,754	639	2,098	2,477	225	591	665	
24	7	51	50	89	118	619	745	884	1,346	1,851	1,552	2,778	2,657	3,160	2,959	4,053	3,958	1,364	1,622	1,750	
Sum	196	192	687	1,769	1,858	5,557	6,724	8,729	16,970	19,139	19,095	29,159	31,584	37,657	29,845	41,112	47,015	16,068	16,683	16,749	

Monthly Comparisons

	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1990	687	5,557	16,970	29,159	29,845	16,068	98,286	
1991	196	1,769	6,724	19,139	31,584	41,112	16,683	117,207
1992	192	1,858	8,729	19,095	37,657	47,015	15,732	130,278

Source: U.S. Forest Service, Cleveland, TN

G-5
GEOLOGY AND SOILS



REPORT
OF
INVESTIGATION

CHARACTERIZATION OF ROCKS
FOR
THE PROPOSED OCOEE OLYMPIC WHITEWATER VENUE
POLK COUNTY, TENNESSEE

prepared for
Pickering
Job No. 11986
Contract No. 53-43ZP-3-03,7-15

Don W. Byerly
Consulting Geologist
PG 6013

INTRODUCTION

The purpose for this investigation is to characterize the bedrock at the proposed Olympic venue on the Ocoee river in Polk County, Tennessee. More specifically it is to determine the capacity, if any, for the rock to produce acidic drainage. The site embraces about 1.25 miles of the Ocoee River channel and its right and left banks between river mile 26.2 and river mile 27.

The bedrock consists of metasedimentary rocks (sedimentary rocks, metamorphosed, but retaining their sedimentary character) ranging in texture from fine-grained argillite to very coarse-grained metagraywacke. In a formal stratigraphic sense these rocks are part of a very thick (10's of thousands of feet) Precambrian unit referred to as the Ocoee Supergroup. Rocks of this unit form the core of the southern Appalachian Blue Ridge Mountains. Formal stratigraphy, however, is not important in the matter of evaluating the character of the rocks. What is important, is the mineralogy of the rock present in the proposed venue area and how these minerals react when weathered.

Silicate minerals dominate rock composition. Pyrite, an iron-disulfide mineral, occurs in variable concentrations, but is ubiquitous throughout the unit. The presence of small amounts of carbonate minerals, such as calcite (the chief mineral of limestone) is indicated by the moderate NP values analyzed for some rock samples. The paucity of carbonate minerals within rocks at the venue site presents a condition with very little natural buffering for acidic conditions. The low buffering capacity provided by the earth materials in the venue area is exacerbated by presence of pyrite capable of producing acid upon weathering.

DISCUSSION

Various iron-disulfide minerals (pyrite or its polymorphs) are disseminated through all rock units comprising the Ocoee Supergroup; however, one of the Ocoee rock units, especially notable for sulfide mineral concentrations high enough to cause acidic drainage in the past, is an argillite called the Anakeesta Formation. Because of its association with acidic drainage (AD) problems, the term Anakeesta has been used generically in the southern Blue Ridge in reference to this type of environmental problem, even though the rock unit involved may not be, in an official sense, correlative to the "type" Anakeesta Formation in the Great Smoky Mountains National Park.

Although pyrite is ubiquitous throughout all Ocoee rock units, concentrations vary. East and north of the proposed venue, concentrations of pyrite and other related sulfide minerals in Ocoee rocks are sufficiently high to warrant past mining activities (Fontana Mines and Ducktown Mines).

A common misconception has been that pyrite, the mineral most commonly responsible for production of acidic conditions, is only associated with carbonaceous or graphitic shale or other argillaceous rocks similar to the Anakeesta Formation. However, pyrite occurs in varying concentrations within all rock types in the venue area. It occurs as euhedral cubic crystals and as finely disseminated grains; both forms of pyrite capable of generating AD when oxidized and leached. The physical properties of pyrite usually allows megascopic identification in rock samples, but finely disseminated pyrite (also, a form very susceptible to oxidation) is not readily observable.

Tests can be run on samples to quantitatively express the potential for developing acidic conditions. The tests are referred to as Acid/Base Accounting. One test determines Neutralization Potential (NP) of a rock. In this analysis a prepared sample is treated with acid and then titrated to determine the amount of acidity consumed by the rock. NP is expressed in Tons CaCO_3 per Thousand Tons of rock. The other test determines the rock's Acid Potential (AP). This is accomplished by analyzing the sample for sulfur content, then, stoichiometrically expressing acidity that could be produced by the sulfur in Tons CaCO_3 per Thousand Tons of Rock. AP is subtracted from NP to determine the Net Neutralization Potential (NNP). NNP values less than -5 Tons CaCO_3 per Thousand Tons of Rock are considered to be potentially deleterious.

Representative samples were collected from outcrops along the river bed, the Old Copper Road, and Highway 64, a transect roughly perpendicular to the structural strike of the bedrock (strike ranges between N 20°-40° E). Approximate locations of samples are indicated on the map. Intervals along the road traverses had no outcrops, thus samples were not collected. Should any of the unsampled intervals be contemplated for excavation, it is recommended that further testing be done.

TABLE I Acid/Base Accounting of Samples

Sample #	N HCl/NaOH	Amt. HCl Used	Amt. NaOH Blank	C	Amt. NaOH Sample	Acid Consum.	NP	%S	AP	NP-AP
OOV-1	0.10	20.00	20.13	0.99	20.20	-0.07	-0.17	0.02	0.61	-0.79
OOV-2	0.10	20.00	20.13	0.99	17.80	2.31	5.79	0.45	14.16	-8.37
OOV-3	0.10	20.00	20.13	0.99	20.10	0.03	0.07	1.03	32.19	-32.11
OOV-4A	0.50	40.00	40.15	1.00	34.50	5.63	70.36	0.00	0.05	70.31
OOV-4B	0.50	80.00	80.80	0.99	75.10	5.64	70.54	0.06	1.73	68.81
OOV-5	0.50	80.00	80.80	0.99	73.60	7.13	89.11	0.01	0.24	88.87
OOV-6	0.50	80.00	80.80	0.99	74.10	6.63	82.92	0.01	0.22	82.71
OOV-7	0.50	80.00	80.80	0.99	75.30	5.45	68.07	0.01	0.27	67.80
OOV-8	0.50	80.00	80.80	0.99	72.00	8.71	108.9	0.01	0.16	108.75
OOV-9	0.10	20.00	20.13	0.99	19.00	1.12	2.81	0.01	0.22	2.59
OOV-10	0.10	20.00	20.13	0.99	21.30	-1.16	-2.91	1.09	34.06	-36.97
OOV-11	0.10	20.00	20.13	0.99	19.90	0.23	0.57	0.50	15.63	-15.05
OOV-12	0.10	20.00	20.13	0.99	20.30	-0.17	-0.42	0.35	10.94	-11.36
OOV-13	0.10	20.00	20.13	0.99	20.30	-0.17	-0.42	2.15	67.19	-67.61
OOV-14	0.10	20.00	20.13	0.99	19.80	0.33	0.82	0.01	0.24	0.58
OOV-15	0.10	20.00	20.13	0.99	20.20	-0.07	-0.17	0.17	5.38	-5.55
OOV-16	0.10	20.00	20.13	0.99	19.40	0.73	1.81	1.64	51.25	-49.44
OOV-17	0.10	20.00	20.13	0.99	18.80	1.32	3.30	0.59	18.44	-15.13
OOV-18	0.10	40.00	40.30	0.99	27.20	13.00	32.51	0.81	25.34	7.16
OOV-19	0.50	40.00	40.15	1.00	33.20	6.92	86.55	0.79	24.81	61.74
OOV-20	0.50	40.00	40.15	1.00	39.30	0.85	10.59	0.39	12.13	-1.54
OOV-21	0.10	40.00	40.30	0.99	38.80	1.49	3.72	0.45	14.16	-10.43
OOV-21'	0.10	20.00	20.13	0.99	20.10	0.03	0.07	0.07	2.03	-1.96
OOV-22	0.10	20.00	20.13	0.99	20.00	0.13	0.32	0.18	5.56	-5.24
OOV-23	0.50	80.00	80.80	0.99	77.80	2.97	37.13	0.39	12.22	24.91
OOV-24	0.50	40.00	40.15	1.00	39.10	1.05	13.08	0.31	9.66	3.42
OOV-25	0.10	20.00	20.13	0.99	18.80	1.32	3.30	0.52	16.34	-13.04
OOV-26	0.10	20.00	20.13	0.99	18.40	1.72	4.30	2.13	66.56	-62.27
OOV-27	0.10	40.00	40.30	0.99	35.00	5.26	13.15	0.37	11.59	1.56
OOV-28	0.50	80.00	80.80	0.99	75.00	5.74	71.78	0.01	0.19	71.59
OOV-29	0.50	80.00	80.80	0.99	75.10	5.64	70.54	0.00	0.03	70.51
OOV-30	0.50	80.00	80.80	0.99	77.00	3.76	47.03	0.01	0.32	46.71
OOV-31	?	0.10	20.00	20.13	0.99	19.30	0.82	2.06	6.47	-4.41

Table I contains the results of the analyses. Acid-producing argillite, metagraywacke, metasandstone, and metasilstone occurs throughout the area. The occurrence of the pyrite is so wide spread and variable in concentration, that every rock should be considered suspect.



Lithologically the samples are as follows:

Argillite:	3	12	13	15	16	21'					
Metasiltstone:	1	4A	8	14	22	23	24	25	27	31	
Metasandstone:	2	5	6	7	17	18	19	20	26	29	30
Metagraywacke:	4B	10	11	21	28						

RECOMMENDATIONS

If Ocoee River quality was merely in equilibrium with the natural acid-producing capabilities of the rocks in the drainage basin, it probably would not be prudent to disturb that condition for the projected short-term economic gain of the project. However, it is my professional opinion that given the conditions as they are, a venue can be constructed on the Ocoee River site, if precautions are taken to prevent acidic drainage and siltation being generated from material disturbed during construction. Although quality of the Ocoee River has been degraded by previous works, this fact should not serve as justification for further water quality deterioration through indiscriminant handling of acid-producing materials.

Recommendations are based first upon the facts that:

- acid-producing rock is present in the area to be developed into an Olympic venue.
- the Ocoee River quality has been degraded by impacts imposed by past mining.

and secondly upon the assumptions that:

- the quality of the Ocoee River is not presently conducive for aquatic biota.
- only minor rock excavation is anticipated.

The following guidelines are offered for development of the venue site:

1. If there is intended disturbance of any of the area not represented by samples collected and analyzed for this report, those areas should be sampled.
2. Excavation of acid-producing rock should be avoided where possible and always minimized. This includes the wasted rock in the fill at the "Blue Hole" parking area near Laurel Creek. On-site specific inspection of all materials to be excavated should be provided by geotechnical personnel.
3. When excavation is necessary samples for NNP analyses should be collected by borings. Such site specific analyses will permit determination of the disposition of the excavated material.
4. Sites for disposal of all anticipated (a worse-case scenario would include 100% of all excavated rock) acid-producing material should be identified during the design phase of the project.
5. Borrow sites from which adequate quantities of cover material for burial of the acid-producing rock should be identified.
6. Encapsulation of pyritic material should follow an acceptable design, either on site or off site.
7. Underdrains, pipe culverts, and storm drains should be constructed of concrete or inert plastic.

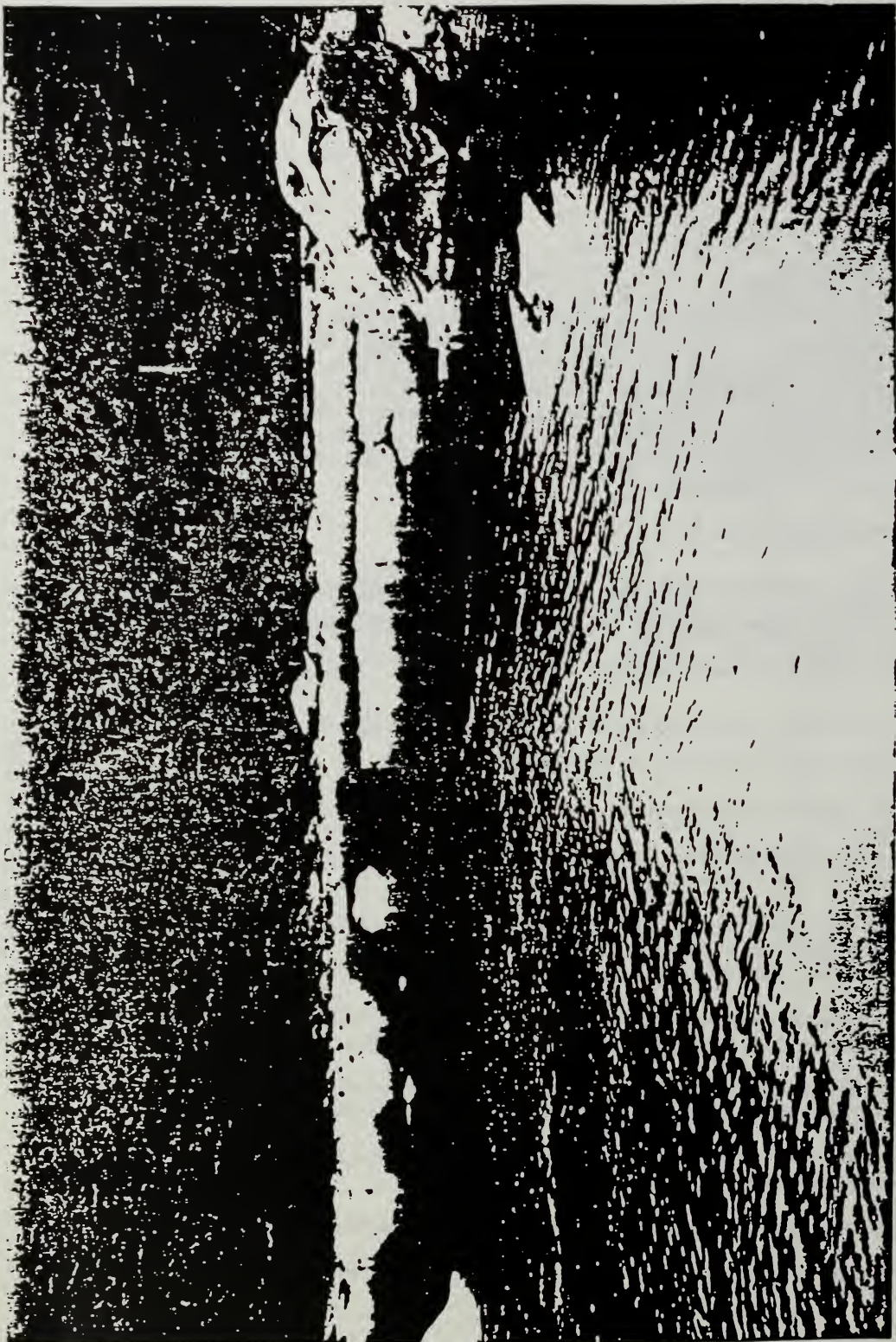


Figure 1. View downstream from the "Blue Hole" toward the beginning of the proposed whitewater course. Rock exposed is represented by samples OOV-10 through OOV-14.

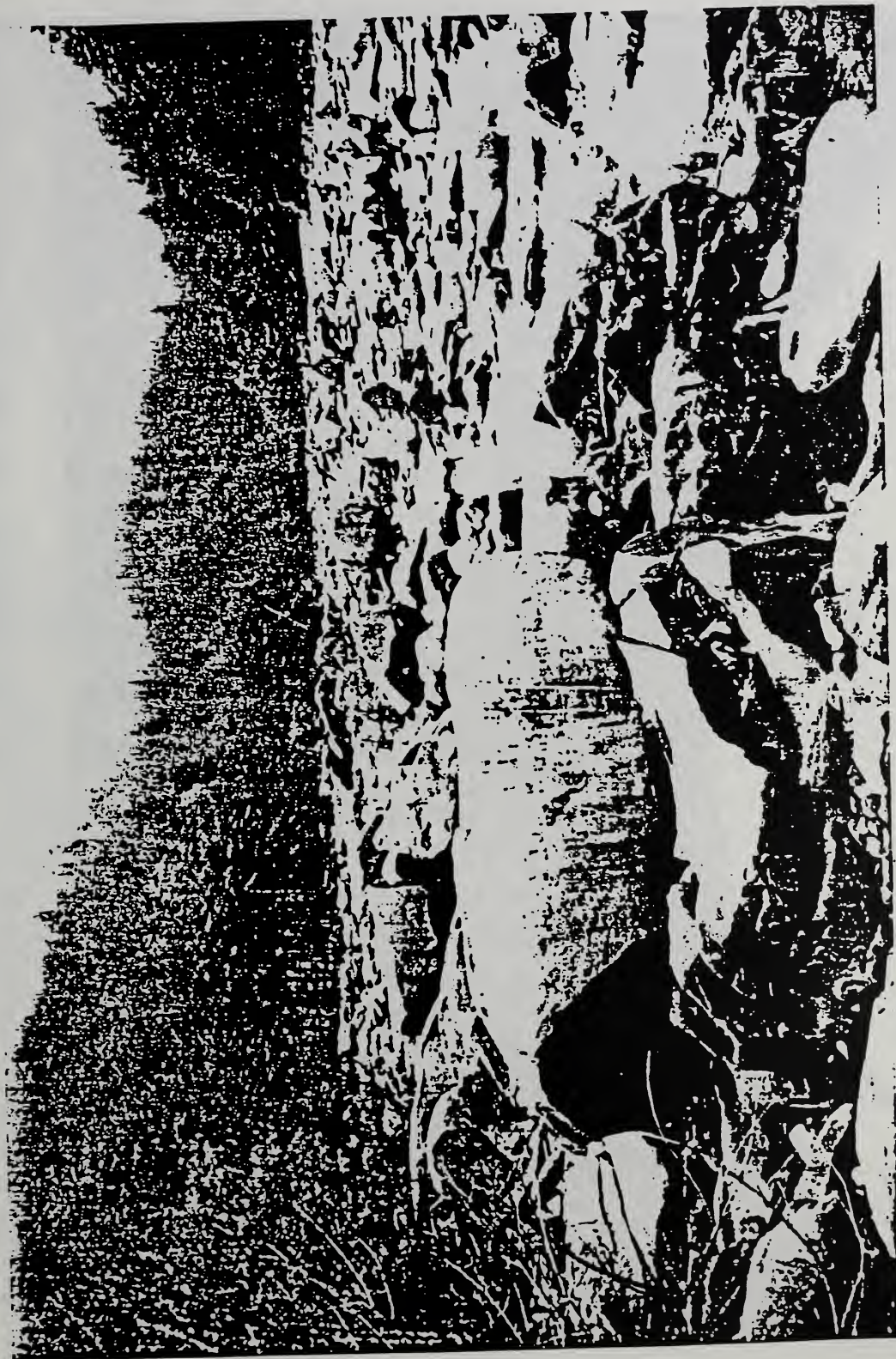


Figure 2. View upstream from the vicinity of the "Blue Hole" toward proposed "put-in". Rock exposed is represented by samples OOV-3 through OOV-9.



Figure 3. View upstream from vicinity of proposed "lower crossing" toward proposed media center on the left bank of the river. Rock along the left bank is represented by samples OOV-21 through OOV-31.



Figure 4. Deformed Ocoee rocks along Highway 64, across from "Blue Hole parking area.

ADYN COMPUTER MODEL

ADYN is a one-dimensional, unsteady flow model which is generic in design to allow application to any site with changes to input data only. The model solves the one-dimensional equations for conservation of mass and momentum using a four-point implicit finite difference scheme with weighted spatial derivatives or a McCormack explicit scheme. ADYN was used to study the unsteady river hydraulics and the effects of the channel geometry and roughness of flow and water surface elevation of the Ocoee River.

Input data used in the model included:

- Channel cross-sections at selected locations, referenced as Ocoee River Mile or ORM;
- Reservoir release flow rates (1,400 and 1,600 cfs) and flood rates (18,000 and 43,500 cfs); and
- Estimates of Manning's roughness coefficient, or Manning's n .

The existing channel cross-sections were developed from the following topographic maps:

- USGS 7.5 minute series (topographic) 133-SW, Ducktown Quadrangle, (40-foot contour interval, photo-revised 1990);
- Betts Engineering and Continental Aerial Surveys topographic map of proposed competitive channel area (10-foot contour interval, prepared 1992); and
- TVA topographic map of proposed competitive channel area (two-foot contour interval, prepared 1993).

In addition, some existing cross-sections from previous work on the Ocoee River were provided by TVA at selected ORMs. Typical cross-sections are presented in Chapter IV.C.10.

Estimates of Manning's roughness coefficients for stream channels were developed from the Guide for Selecting Manning's Roughness Coefficients for Natural Channels and Flood Plains.

Models such as ADYN, are only capable of predicting effects of model input. Input values, based on reference literature, may not accurately predict actual occurrences. As a result, TVA is developing a scale, physical model of the proposed competitive channel to both refine design values and to predict effects of input conditions. Results of the physical model are not available at the time of publication of this document.

CHANNEL STABILITY

The current channel stability on the Ocoee River was described in Chapter III.A.10 in terms of erosion, sedimentation, sluicing operations, and flood events. In summary, erosion from small watersheds within Copper Basin has caused loss of Ocoee reservoir volumes because of sediment accumulation. The erosion rate for the Copper Basin area, expressed in tons/mi²/year, has been estimated to be from 100 to 1,000 times greater than erosion rates for forested and agricultural areas in the region.

Sluicing operations intended to alleviate the buildup of sediments in front of the intake of the tunnel that leads to the Ocoee No. 3 Powerhouse were conducted from 1960 until recent years; however, according to sources at TVA, sluicing operations are no longer performed at Ocoee No. 3.

Flooding on the Ocoee River has been severe at times. A flood occurring on February 17, 1990, which has not been formally categorized, is believed to have had a greater than 500-year frequency return interval. During the flood, peak flows were estimated at 43,500 cfs. The 100-year flood frequency for the river has been estimated at 18,000 cfs by TVA. The Flood Insurance Rate Map (FIRM) for the proposed competitive channel area has not yet been issued by FEMA; therefore, the 100-year and 500-year floodplains and the regulatory floodway have not been delineated. The TVA estimations of the 100- and + 500-year input for the model runs, as these data are the only ones available for the site area.

Prior to construction of the proposed channel, a "No Rise" certification will need to be submitted and approved. FEMA has directed that a particular computer model, the step-backwater model, be used to determine the 100-year floodway elevations for revised existing conditions at the proposed project site. At that time, more information will be available regarding the floodway and floodplains delineations for the site area.

Using ADYN, the proposed flow rates for the competitive channel (1,400 cfs and 1,600 cfs) were used to estimate the water surface profile for the existing geometry of the river between the tailwater of Ocoee No. 3 (at ORM 29.1) to the headwaters of Ocoee No. 2 (at ORM 24.2). The input flow rates were held at a constant rate for eight hours, to correspond with the proposed release schedule. The upstream reach, Blue Ridge Reservoir to Ocoee No. 3, was not included in the evaluation, since the storage capacity of Ocoee No. 3 will attenuate any variability in water surface elevations. (The useful controlled storage volume of Ocoee No. 3 Reservoir is 3,629 acre-feet. An 8-hour recreational [whitewater] release at the rate of 1,600 cfs would require approximately 46,080,000 ft³ of water, or 1,060 acre-feet, which is less than one-third of the useful controlled storage volume of Ocoee No. 3. Nevertheless, TVA has stated that Ocoee No. 3 does not have sufficient storage capacity to provide all of the desired releases for the current Ocoee No. 2 recreational schedule and the proposed additional Ocoee No. 3 schedule. TVA would find it necessary to carefully coordinate releases from each project to ensure sufficient water is available at the scheduled times. Water from Blue Ridge Lake could be released for a few hours early in the morning to provide sufficient water for Ocoee No. 3 releases occurring late in the day.)

The downstream reach, Ocoee No. 2 to Ocoee No. 1, was not included in the evaluation, since water can either be routed to the flume for power generation or released to the natural riverbed to support the existing recreational releases.

Water depths along the reach range from approximately 2 feet upstream of the Blue Hole to approximately 30 feet at Ocoee No. 2. In the area proposed for the competitive channel, the water depth ranges between three and four feet.

Similarly, the water surface profiles for the No Action Alternative were developed for the 100-year and greater than 500-year (+500-year) floods (18,000 cfs and 43,500 cfs, respectively). The hydrographs for the 100-year and +500-year floods were assumed for a duration of 10 hours that peaked at the referenced flow rates. In the area proposed for the competitive channel, the water depth ranges between approximately 4.0 and 20 feet. For the +500-year flood event, the water surface elevation at ORM 26.13 is approximately two feet above the elevation of Highway 64. For reference, the difference in elevation between the road and the channel bottom is approximately 10 feet at river mile 26.13.

Project Area Sampling Results

Sample #	N HCl/NaOH	Amt. HCl Used	Amt. NaOH Blank	C	Amt. NaOH Sample	Acid Consum.	NP	%S	AP	NP-AP
OOV-1	0.10	20.00	20.13	0.99	20.20	-0.07	-0.17	0.02	0.61	-0.79
OOV-2	0.10	20.00	20.13	0.99	17.80	2.31	5.79	0.45	14.16	-8.37
OOV-3	0.10	20.00	20.13	0.99	20.10	0.03	0.07	1.03	32.19	-32.11
OOV-4A	0.50	40.00	40.15	1.00	34.50	5.63	70.36	0.00	0.05	70.31
OOV-4B	0.50	80.00	80.80	0.99	75.10	5.64	70.54	0.06	1.73	68.81
OOV-5	0.50	80.00	80.80	0.99	73.60	7.13	89.11	0.01	0.24	88.87
OOV-6	0.50	80.00	80.80	0.99	74.10	6.63	82.92	0.01	0.22	82.71
OOV-7	0.50	80.00	80.80	0.99	75.30	5.45	68.07	0.01	0.27	67.80
OOV-8	0.50	80.00	80.80	0.99	72.00	8.71	108.90	0.01	0.16	108.75
OOV-9	0.10	20.00	20.13	0.99	19.00	1.12	2.81	0.01	0.22	2.59
OOV-10	0.10	20.00	20.13	0.99	21.30	-1.16	-2.91	1.09	34.06	-36.97
OOV-11	0.10	20.00	20.13	0.99	19.90	0.23	0.57	0.50	15.63	-15.05
OOV-12	0.10	20.00	20.13	0.99	20.30	-0.17	-0.42	0.35	10.94	-11.36
OOV-13	0.10	20.00	20.13	0.99	20.30	-0.17	-0.42	2.15	67.19	-67.61
OOV-14	0.10	20.00	20.13	0.99	19.80	0.33	0.82	0.01	0.24	0.58
OOV-15	0.10	20.00	20.13	0.99	20.20	-0.07	-0.17	0.17	5.38	-5.55
OOV-16	0.10	20.00	20.13	0.99	19.40	0.73	1.81	1.64	51.25	-49.44
OOV-17	0.10	20.00	20.13	0.99	18.80	1.32	3.30	0.59	18.44	-15.13
OOV-18	0.10	40.00	40.30	0.99	27.20	13.00	32.51	0.81	25.34	7.16
OOV-19	0.50	40.00	40.15	1.00	33.20	6.92	86.55	0.79	24.81	61.74
OOV-20	0.50	40.00	40.15	1.00	39.30	0.85	10.59	0.39	12.13	-1.54
OOV-21	0.10	40.00	40.30	0.99	38.80	1.49	3.72	0.45	14.16	-10.43
OOV-21'	0.10	20.00	20.13	0.99	20.10	0.03	0.07	0.07	2.03	-1.96
OOV-22	0.10	20.00	20.13	0.99	20.00	0.13	0.32	0.18	5.56	-5.24
OOV-23	0.50	80.00	80.80	0.99	77.80	2.97	37.13	0.39	12.22	24.91
OOV-24	0.50	40.00	40.15	1.00	39.10	1.05	13.08	0.31	9.66	3.42
OOV-25	0.10	20.00	20.13	0.99	18.80	1.32	3.30	0.52	16.34	-13.04
OOV-26	0.10	20.00	20.13	0.99	18.40	1.72	4.30	2.13	66.56	-62.27
OOV-27	0.10	40.00	40.30	0.99	35.00	5.26	13.15	0.37	11.59	1.56
OOV-28	0.50	80.00	80.80	0.99	75.00	5.74	71.78	0.01	0.19	71.59
OOV-29	0.50	80.00	80.80	0.99	75.10	5.64	70.54	0.00	0.03	70.51
OOV-30	0.50	80.00	80.80	0.99	77.00	3.76	47.03	0.01	0.32	46.71
OOV-31	0.10	20.00	20.13	0.99	19.30	0.82	2.06	0.21	6.47	-4.41

1. Shaded Samples with NP-AP values of less than -5 have the potential to produce significant acid drainage.

2. NP-AC grams of acidity or neutralization potential are expressed in CaCO₃ equivalents.

3. Source: BYERLY, DON W., 1992.

G-7
VEGETATION

COMPARTMENT DATA

The following table presents a detailed analysis of compartments inventoried as part of the EIS.

Characteristics of Forest Stands Olympic Venue Area

Description	Forest Cover Type	Acres
Compartment 316		
Virginia Pine	33	201
White Oak-Northern Red Oak-Hickory	53	148
Scarlet Oak	59	133
Shortleaf Pine	32	65
Cove Hardwoods-White Pine-Hemlock	41	15
Not Typed		4
Total		566
Number of Stands -- 13		
Age of Stands -- 0 to 59 years		
Compartment 320		
White Oak - Northern Red Oak - Hickory	53	1,040
Shortleaf Pine	32	286
Yellow Poplar-Northern Red Oak-White Oak	56	242
Virginia Pine	33	53
Not Typed		69
Total		976
Number of Stands -- 35		
Age of Stands -- 0 to 63 years		
Compartment 330		
White Oak-Northern Red Oak-Hickory	53	585
Yellow Poplar-White Oak-Northern Red Oak	56	89
Virginia Pine-Oak	16	65
Shortleaf Pine	32	100
Cove Hardwoods-White Pine-Hemlock	41	68
Not Typed		69
Total		976
Number of Stands -- 23		
Age of Stands -- 0 to 75 years		

**Characteristics of Forest Stands
Olympic Venue Area (continued)**

Description	Forest Cover Type	Acres
Compartment 359		
White Oak-Northern Red Oak-Hickory	53	407
Yellow Poplar-White Oak-Northern Red Oak	56	285
Chestnut Oak-Scarlet Oak-Yellow Pine	45	144
Shortleaf Pine	32	70
Virginia Pine-Oak	16	51
Virginia Pine	33	39
Chestnut Oak-Scarlet Oak	60	22
Scarlet Oak	59	14
White Oak	54	10
White Pine-Cove Hardwood	09	10
Not Typed		20
Total		1,072
Number of Stands -- 23		
Age of Stands -- 0 to 85 years		
Compartment 360		
Virginia Pine-Oak	16	312
White Oak-Northern Red Oak-Hickory	53	209
Virginia Pine	33	165
Chestnut Oak-Scarlet Oak-Yellow Pine	45	82
Scarlet Oak	59	77
Yellow Poplar-White Oak-Northern Red Oak	56	43
Not Typed		32
Total		920
Number of Stands -- 24		
Age of Stands -- 0 to 80 years		
Compartment 361		
White Oak-Northern Red Oak-Hickory	53	601
Yellow Poplar-White Oak-Northern Red Oak	56	151
Virginia Pine	33	94
Chestnut Oak-Scarlet Oak-Yellow Pine	45	86
Not Typed		4
Total		936
Number of Stands -- 9		
Age of Stands -- 0 to 82 years		

**Characteristics of Forest Stands
Olympic Venue Area (continued)**

Description	Forest Cover Type	Acres
Compartment 364		
White Oak-Northern Red Oak-Hickory	53	567
Yellow Poplar-White Oak-Northern Red Oak	56	210
Virginia Pine	33	192
Chestnut Oak-Scarlet Oak	60	46
White Oak-Black Oak-Yellow Poplar	47	14
Virginia Pine-Oak	16	10
Chestnut Oak-Scarlet Oak-Yellow Pine	45	10
Not Typed		63
Total		1,112
Number of Stands -- 33		
Age of Stands -- 0 to 80 years		

**G-8
WILDLIFE**

Amphibians that have been reported from Polk County^a, Tennessee and probability that they occur in the Ocoee River Gorge.

Common Name	Scientific Name	Probability of Occurrence ^b
Spotted Salamander	<i>Ambystoma maculatum</i>	H,O
Marbled Salamander	<i>Ambystoma opacum</i>	H
Mole Salamander	<i>Ambystoma talpoideum</i>	L
Tiger Salamander	<i>Ambystoma tigrinum</i>	L
Eastern Hellbender	<i>Cryptobranchus allenganiensis</i>	L
Seepage Salamander	<i>Desmognathus aeneus</i>	M
Dusky Salamander	<i>Desmognathus fuscus</i>	H
Seal Salamander	<i>Desmognathus monticola</i>	M
Mountain Dusky Salamander	<i>Desmognathus ochrophaeus</i>	M
Blackbelly Salamander	<i>Desmognathus quadramaculatus</i>	M
Two-Lined Salamander	<i>Eurycea bislineata</i>	H
Long-Tailed Salamander	<i>Eurycea longicauda</i>	H
Cave Salamander	<i>Eurycea lucifuga</i>	M
Spring Salamander	<i>Gyrinophilus porphyriticus</i>	M
Four-Toed Salamander	<i>Hemidactylium scutatum</i>	M
Zigzag Salamander	<i>Plethodon dorsalis</i>	H
Slimy Salamander	<i>Plethodon glutinosus</i>	H
Red-Backed Salamander	<i>Plethodon serratus</i>	M
Tellico Salamander	<i>Plethodon aureolus</i>	L
Mud Salamander	<i>Pseudotriton montanus</i>	M
Red Salamander	<i>Pseudotriton ruber</i>	H
Mudpuppy	<i>Necturus maculosus</i>	L

Common Name	Scientific Name	Probability of Occurrence ^b
Red-Spotted Newt	<i>Notophthalmus viridescens</i>	H
American Toad	<i>Bufo americanus</i>	H
Woodhouse's Toad	<i>Bufo woodhousei</i>	H
Northern Cricket Frog	<i>Acris crepitans</i>	H
Mountain Chorus Frog	<i>Pseudacris branchyphona</i>	H
Striped Chorus Frog	<i>Pseudacris triseriata</i>	H
Spring Peeper	<i>Hyla crucifer</i>	H
Gray Treefrog ^c	<i>Hyla versicolor</i>	H
Eastern Narrowmouth Toad	<i>Gastrophryne carolinensis</i>	H
Eastern Spadefoot	<i>Scaphiopus holbrookii</i>	M
Bullfrog	<i>Rana catesbeiana</i>	H
Green Frog	<i>Rana clamitans</i>	H
Pickerel Frog	<i>Rana palustris</i>	H
Wood Frog	<i>Rana sylvatica</i>	M

^a From Tennessee Wildlife Resources Agency Files (1993).

^b H=High M=Moderate L=Low O=Observed.

^c Not on database list, but probably present.

Reptiles that have been reported from Polk County^a, Tennessee and probability that they occur in the Ocoee River Gorge.

Common Name	Scientific Name	Probability of Occurrence ^b
Snapping Turtle	<i>Chelydra serpentina</i>	H
Painted Turtle	<i>Chrysemys picta</i>	L
Bog Turtle	<i>Clemmys muhlenbergii</i>	L
Map Turtle	<i>Graptemys geographica</i>	L
Eastern Box Turtle	<i>Terrapene carolina</i>	H
Common Slider	<i>Pseudemys scripta</i>	L
Common Mud Turtle	<i>Kinosternon subrubrum</i>	M
Loggerhead Musk Turtle	<i>Sternothaerus minor</i>	M
Stinkpot	<i>Sternothaerus odoratus</i>	M
Spiny Softshell	<i>Trionx spiniferus</i>	L
Slender Glass Lizard	<i>Ophisaurus attenuatus</i>	M
Green Anole	<i>Anolis carolinensis</i>	H,O
Eastern Fence Lizard	<i>Sceloporus undulatus</i>	H
Five-Lined Skink	<i>Eumeces fasciatus</i>	H
Southeastern Five-Lined Skink	<i>Eumeces inexpectatus</i>	M
Broad-Headed Skink	<i>Eumeces laticeps</i>	H
Ground Skink	<i>Scincella lateralis</i>	H
Six-Lined Racerrunner	<i>Cnemidophorus sexlineatus</i>	L
Worm Snake	<i>Carphophis amoenus</i>	H
Scarlet Snake	<i>Cemophora coccinea</i>	L
Racer	<i>Coluber constrictor</i>	H
Ring-Necked Snake	<i>Diadophis punctatus</i>	H

Common Name	Scientific Name	Probability of Occurrence ^b
Rat Snake	<i>Elaphe obsoleta</i>	H
Eastern Hognose Snake	<i>Heterodon platyrhinos</i>	H
Prairie Snake	<i>Lampropeltis calligaster</i>	H
Common Kingsnake	<i>Lampropeltis getulus</i>	H
Milk Snake	<i>Lampropeltis triangulum</i>	H
Northern Water Snake	<i>Nerodia sipedon</i>	H
Rough Green Snake	<i>Opheodrys aestivus</i>	H
Northern Pine Snake ^c	<i>Pituophis melanoleucus</i>	L
Queen Snake	<i>Regina septemvittata</i>	M
Brown Snake	<i>Storeria dekayi</i>	H
Redbelly Snake	<i>Storeria occipitomaculata</i>	H
Southeastern Crown Snake	<i>Tantilla coronata</i>	M
Eastern Ribbon Snake	<i>Thamnophis sauritus</i>	H
Common Garter Snake	<i>Thamnophis sirtalis</i>	H
Smooth Earth Snake	<i>Virginia valeriae</i>	H
Copperhead	<i>Agkistrodon contortrix</i>	H
Timber Rattlesnake	<i>Crotalus horridus</i>	H

^a From Tennessee Wildlife Resources Agency Files (1993).

^b H=High M=Moderate L=Low O=Observed.

^c Considered a sensitive species by the Regional Forester (See TES section).

Birds that have been reported from Polk County^a, Tennessee and probability that they occur in the Ocoee River Gorge.

Common Name	Scientific Name	Probability of Occurrence ^b
Cooper's Hawk	<i>Accipiter cooperii</i>	M
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	H
Wood Duck	<i>Aix sponsa</i>	H
Northern Pintail	<i>Anas acuta acuta</i>	L
American Wigeon	<i>Anas americana</i>	L
Northern Shoveler	<i>Anas clypeata</i>	L
Blue-Winged Teal	<i>Anas discors</i>	L
Mallard	<i>Anas platyrhynchos</i>	L
Black Duck	<i>Anas rubripes</i>	L
Gadwall	<i>Anas strepera</i>	L
Water Pipit	<i>Anthus spinoletta</i>	L
Golden Eagle	<i>Aquila chrysaetos</i>	L
Ruby-Throated Hummingbird	<i>Archilochus colubris</i>	H
Short-Eared Owl	<i>Asio flammeus</i>	L
Long-Eared Owl	<i>Asio otus</i>	L
Lesser Scaup	<i>Aythya affinis</i>	L
Redhead	<i>Aythya americana</i>	L
Ring-Necked Duck	<i>Aythya collaris</i>	L
Canvasback	<i>Aythya valisineria</i>	L
Upland Sandpiper	<i>Bartramia longicauda</i>	L
Cedar Waxwing	<i>Bombycilla cedrorum</i>	H
Ruffed Grouse	<i>Bonasa umbellus</i>	H,O

Common Name	Scientific Name	Probability of Occurrence ^b
American Bittern	<i>Botaurus lentiginosus</i>	L
Canada Goose	<i>Branta canadensis</i>	L
Bufflehead	<i>Bucephala albeola</i>	L
Common Goldeneye	<i>Bucephala clangula</i>	L
Rough-Legged Hawk	<i>Buteo lagopus</i>	L
Broad-Winged Hawk	<i>Buteo platypterus</i>	H
Green-Backed Heron	<i>Butorides striatus</i>	M
Lapland Longspur	<i>Calcarius lapponicus</i>	L
White-Rumped Sandpiper	<i>Calidris fuscicollis</i>	L
Western Sandpiper	<i>Calidris mauri</i>	L
Pectoral Sandpiper	<i>Calidris melanotos</i>	L
Least Sandpiper	<i>Calidris minutilla</i>	M
Semipalmated Sandpiper	<i>Calidris pusilla</i>	L
Chuck-Will's-Widow	<i>Caprimulgus carolinensis</i>	H
Northern Cardinal	<i>Cardinalis cardinalis</i>	H,O
Pine Siskin	<i>Carduelis pinus</i>	H
American Goldfinch	<i>Carduelis tristis</i>	H,O
House Finch	<i>Carpodacus mexicanus</i>	L
Purple Finch	<i>Carpodacus purpureus</i>	M
Turkey Vulture ^c	<i>Cathartes aura</i>	H
Gray-Cheeked Thrush	<i>Catharus minimus</i>	M
Swainson's Thrush	<i>Catharus ustulatus</i>	M
Eastern Willet	<i>Catoptrophorus semipalmatus</i>	L

Common Name	Scientific Name	Probability of Occurrence ^b
Brown Creeper	<i>Certhia americana</i>	H,O
Chimney Swift	<i>Chaetura pelagica</i>	H
Semipalmated Plover	<i>Charadrius semipalmatus</i>	L
Killdeer	<i>Charadrius vociferus</i>	H
Black Tern	<i>Chlidonias niger</i>	L
Common Nighthawk	<i>Chordeiles minor</i>	H
Marsh Wren	<i>Cistothorus palustris</i>	L
Sedge Wren	<i>Cistothorus platensis</i>	L
Evening Grosbeak	<i>Coccothaustes vespertinus</i>	M
Yellow-Billed Cuckoo	<i>Coccyzus americanus</i>	H
Black-Billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	M
Northern Flicker	<i>Colaptes auratus</i>	H,O
Northern Bobwhite	<i>Colinus virginianus</i>	M
Rock Dove	<i>Columba livia</i>	H
Olive-Sided Flycatcher	<i>Contopus borealis</i>	L
Eastern-Wood Pewee	<i>Contopus virens</i>	H
Black Vulture ^c	<i>Coragyps atratus</i>	H
American Crow	<i>Corvus brachyrhynchos</i>	H,O
Blue Jay	<i>Cyanocitta cristata</i>	H,O
Bl.-Throated Blue Warbler	<i>Dendroica caerulescens</i>	M
Bay Breasted Warbler	<i>Dendroica castanea</i>	H
Cerulean Warbler	<i>Dendroica cerulea</i>	M

Common Name	Scientific Name	Probability of Occurrence ^b
Yellow-Rumped Warbler	<i>Dendroica coronata</i>	H,O
Prairie Warbler	<i>Dendroica discolor</i>	M
Yellow-Throated Warbler	<i>Dendroica dominica</i>	M
Blackburnian Warbler	<i>Dendroica fusca</i>	M
Magnolia Warbler	<i>Dendroica magnolia</i>	M
Palm Warbler	<i>Dendroica palmarum</i>	M
Chestnut-Sided Warbler	<i>Dendroica pensylvanica</i>	M
Yellow Warbler	<i>Dendroica petechia</i>	H
Pine Warbler	<i>Dendroica pinus</i>	H,O
Blackpoll Warbler	<i>Dendroica striata</i>	M
Cape May Warbler	<i>Dendroica tigrina</i>	M
Bobolink	<i>Dolichonyx oryzivorus</i>	L
Pileated Woodpecker ^d	<i>Dryocopus pileatus</i>	H,O
Gray Catbird	<i>Dumetella carolinensis</i>	H
Yel.-Bellied Flycatcher	<i>Empidonax flaviventris</i>	M
Least Flycatcher	<i>Empidonax minimus</i>	M
Willow Flycatcher	<i>Empidonax traillii</i>	M
Acadian Flycatcher	<i>Empidonax virescens</i>	H
Horned Lark	<i>Eremophila alpestris</i>	L
Rusty Blackbird	<i>Euphagus carolinus</i>	M
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	L
Merlin	<i>Falco columbarius</i>	L
American Kestrel ^{c,d}	<i>Falco sparverius</i>	M
Common Loon	<i>Gavia immer</i>	L

Common Name	Scientific Name	Probability of Occurrence ^b
Common Yellowthroat	<i>Geothlypis trichas</i>	H
Blue Grosbeak	<i>Guiraca caerulea</i>	M
Bald Eagle ^e	<i>Haliaeetus leucocephalus</i>	H
Worm-Eating Warbler	<i>Helmitheros vermivorus</i>	H
Barn Swallow	<i>Hirundo rustica</i>	H
Wood Thrush	<i>Hylocichla mustelina</i>	H
Yellow-Breasted Chat ^d	<i>Icteria virens</i>	H
Northern Oriole	<i>Icterus galbula</i>	H
Orchard Oriole	<i>Icterus spurius</i>	H
Dark-Eyed Junco	<i>Junco hyemalis</i>	H,O
Ring-Billed Gull	<i>Larus delawarensis</i>	L
Bonaparte's Gull	<i>Larus philadelphia</i>	L
Long-Billed Dowitcher	<i>Limnodromus scolopaceus</i>	L
Swainson's Warbler	<i>Limnithlypis swainsonii</i>	L
Red Crossbill	<i>Loxia curvirostra</i>	L
Belted Kingfisher	<i>Megasceryle alcyon</i>	H,O
Red-Bellied Woodpecker	<i>Melanerpes carolinus</i>	H,O
Wild Turkey	<i>Meleagris gallopavo</i>	H,O
Swamp Sparrow	<i>Melospiza georgiana</i>	H
Lincoln's Sparrow	<i>Melospiza lincolnii</i>	L
Song Sparrow	<i>Melospiza melodia</i>	H,O
Common Merganser	<i>Mergus merganser</i>	L

Common Name	Scientific Name	Probability of Occurrence ^b
Red-Breasted Merganser	<i>Mergus serrator</i>	L
Stilt Sandpiper	<i>Micropalama himantopus</i>	L
Northern Mockingbird	<i>Mimus polyglottos</i>	H
Black-and-White Warbler	<i>Mniotilta varia</i>	H
Brown-Headed Cowbird	<i>Molothrus ater</i>	H
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	H
Connecticut Warbler	<i>Oporornis agilis</i>	L
Kentucky Warbler	<i>Oporornis formosus</i>	H
Mourning Warbler	<i>Oporornis philadelphia</i>	M
Eastern Screech Owl	<i>Otus asio</i>	H
Ruddy Duck	<i>Oxyura jamaicensis</i>	L
Northern Parula Warbler	<i>Parula americana</i>	H
Black-Capped Chickadee	<i>Parus atricapillus</i>	L
Tufted Titmouse	<i>Parus bicolor</i>	H,O
Carolina Chickadee	<i>Parus carolinensis</i>	H,O
House Sparrow	<i>Passer domesticus</i>	H
Savannah Sparrow	<i>Passerculus sandwichensis</i>	M
Fox Sparrow	<i>Passerella iliaca</i>	M
Indigo Bunting	<i>Passerina cyanea</i>	H
Wilson's Phalarope	<i>Phalaropus tricolor</i>	L
American Woodcock	<i>Philohela minor</i>	H
Red-Cockaded Woodpecker	<i>Picoides borealis</i>	L
Downy Woodpecker	<i>Picoides pubescens</i>	H,O

Common Name	Scientific Name	Probability of Occurrence ^b
Hairy Woodpecker	<i>Picoides villosus</i>	H,O
Rufus-Sided Towhee	<i>Pipilo erythrophthalmus</i>	H,O
Scarlet Tanager	<i>Piranga olivacea</i>	H
Summer Tanager	<i>Piranga rubra</i>	H
Lesser Golden Plover	<i>Pluvialis dominica</i>	L
Black-Bellied Plover	<i>Pluvialis squatarola</i>	L
Horned Grebe	<i>Podiceps auritus</i>	L
Blue-Gray Gnatcatcher	<i>Polioptila caerulea</i>	H
Vesper Sparrow	<i>Pooecetes gramineus</i>	L
Sora	<i>Porzana carolina</i>	L
Purple Martin	<i>Progne subis</i>	M
Prothonotary Warbler	<i>Protonotaria citrea</i>	L
Common Grackle	<i>Quiscalus quiscula</i>	H
King Rail	<i>Rallus elegans</i>	L
Ruby-Crowned Kinglet	<i>Regulus calendula</i>	H,O
Golden-Crowned Kinglet	<i>Regulus satrapa</i>	H,O
Eastern Phoebe	<i>Sayornis phoebe</i>	H
Ovenbird	<i>Seiurus aurocapillus</i>	H
Louisiana Waterthrush	<i>Seiurus motacilla</i>	H
Northern Waterthrush	<i>Seiurus noveboracensis</i>	M
American Redstart	<i>Setophaga ruticilla</i>	H
Eastern Bluebird ^d	<i>Sialia sialis</i>	M
Red-Breasted Nuthatch	<i>Sitta canadensis</i>	M

Common Name	Scientific Name	Probability of Occurrence ^b
White-Breasted Nuthatch	<i>Sitta carolinensis</i>	H
Dickcissel	<i>Spiza americana</i>	L
American Tree Sparrow	<i>Spizella arborea</i>	L
Chipping Sparrow	<i>Spizella passerina</i>	H
Field Sparrow	<i>Spizella pusilla</i>	H
No. Rough-Winged Swallow	<i>Stelgidopteryx serripennis</i>	H
Caspian Tern	<i>Sterna caspia</i>	L
Forster's Tern	<i>Sterna forsteri</i>	L
Common Tern	<i>Sterna hirundo</i>	L
Barred Owl	<i>Strix varia</i>	H
Eastern Meadowlark	<i>Sturnella magna</i>	M
European Starling	<i>Sturnus vulgaris</i>	H
Tree Swallow	<i>Tachycineta bicolor</i>	H
Carolina Wren	<i>Thryothorus ludovicianus</i>	H,O
Brown Thrasher	<i>Toxostoma rufum</i>	H,O
Lesser Yellowlegs	<i>Tringa flavipes</i>	L
Greater Yellowlegs	<i>Tringa melanoleuca</i>	L
House Wren	<i>Triglodytes aedon</i>	M
Winter Wren	<i>Troglodytes troglodytes</i>	H
Buff-Breasted Sandpiper	<i>Tryngites subruficollis</i>	L
American Robin	<i>Turdus migratorius</i>	H,O
Eastern Kingbird	<i>Tyrannus tyrannus</i>	H
Orange-Crowned Warbler	<i>Vermivora celata</i>	H

Common Name	Scientific Name	Probability of Occurrence ^b
Golden-Winged Warbler	<i>Vermivora chrysoptera</i>	M
Tennessee Warbler	<i>Vermivora peregrina</i>	H
Blue-Winged Warbler	<i>Vermivora pinus</i>	M
Nashville Warbler	<i>Vermivora ruficapilla</i>	M
Yellow-Throated Vireo	<i>Vireo flavifrons</i>	H
White-Eyed Vireo	<i>Vireo griseus</i>	H
Red-Eyed Vireo	<i>Vireo olivaceus</i>	H
Philadelphia Vireo	<i>Vireo philadelphicus</i>	M
Solitary Vireo	<i>Vireo solitarius</i>	M
Canada Warbler	<i>Wilsonia canadensis</i>	H
Hooded Warbler	<i>Wilsonia citrina</i>	H
Wilson's Warbler	<i>Wilsonia pusilla</i>	M
Mourning Dove	<i>Zenaida macroura</i>	H,O
White-Throated Sparrow	<i>Zonotrichia albicollis</i>	H,O
White-Crowned Sparrow	<i>Zonotrichia leucophrys</i>	H

^a From Tennessee Wildlife Resources Agency Files (1993).

^b H=High M=Moderate L=Low O=Observed.

^c Not on database list, but probably present.

^d Management Indicator Species (See Wildlife section).

^e Considered sensitive species by the Regional Forester (See TES section).

Mammals that have been reported from Polk County^a, Tennessee and probability that they occur in the Ocoee River Gorge.

Common Name	Scientific Name	Probability of Occurrence ^b
Masked Shrew	<i>Sorex cinereus</i>	H
Southeastern Shrew	<i>Sorex longirostris</i>	H
Water Shrew ^c	<i>Sorex palustris</i>	L
Smoky Shrew	<i>Sorex fumeus</i>	H
Least Shrew	<i>Cryptotis parva</i>	M
Hairy-Tailed Mole ^c	<i>Parascalops breweri</i>	L
Eastern Mole	<i>Scalopus aquaticus</i>	H
Star-Nosed Mole ^c	<i>Condylura cristata</i>	L
Small-Footed Myotis	<i>Myotis leibii</i>	M
Silver-Haired Bat	<i>Lasionycteris noctivagans</i>	H
Eastern Pipistrel	<i>Pipistrellus subflavus</i>	H
Big Brown Bat	<i>Eptesicus fuscus</i>	H
Red Bat	<i>Lasiurus borealis</i>	H
Hoary Bat	<i>Lasiurus cinereus</i>	H
Rafinesque's Big-Eared Bat ^c	<i>Plecotus rafinesquii</i>	L
Brazilian Freetail Bat	<i>Tadarida brasiliensis</i>	M
Eastern Cottontail Rabbit	<i>Sylvilagus floridanus</i>	H
New England Cottontail ^c	<i>Sylvilagus transitionalis</i>	L
Beaver ^d	<i>Castor canadensis</i>	H,O
Eastern Chipmunk	<i>Tamias striatus</i>	H
Woodchuck	<i>Marmota monax</i>	H
Gray Squirrel	<i>Sciurus carolinensis</i>	H

Common Name	Scientific Name	Probability of Occurrence ^b
Fox Squirrel	<i>Sciurus niger</i>	M
Southern Flying Squirrel	<i>Glaucomys volans</i>	H
Northern Flying Squirrel ^c	<i>Glaucomys sabrinus</i>	L
Marsh Rice Rat	<i>Oryzomys palustris</i>	L
Eastern Harvest Mouse	<i>Reithrodontomys humulis</i>	M
Oldfield Mouse	<i>Peromyscus polionotus</i>	H
White-Footed Mouse	<i>Peromyscus leucopus</i>	H
Golden Mouse	<i>Ochrotomys nuttalli</i>	H
Eastern Woodrat	<i>Neotoma floridana</i>	H
Pine Vole	<i>Pitymys pinetorum</i>	H
Muskrat	<i>Ondatra zibethicus</i>	H
Black Rat	<i>Rattus rattus</i>	H
Norway Rat	<i>Rattus norvegicus</i>	H
House Mouse	<i>Mus musculus</i>	H
Meadow Jumping Mouse	<i>Zapus hudsonius</i>	H
Woodland Jumping Mouse	<i>Napaeozapus insignis</i>	H
Eastern Coyote	<i>Canis latrans</i>	M
Red Fox	<i>Vulpes vulpes</i>	H
Gray Fox	<i>Urocyon cinereoargenteus</i>	H
Black Bear ^e	<i>Ursus americanus</i>	H,O
Raccoon	<i>Procyon lotor</i>	H,O
Least Weasel ^c	<i>Mustela nivalis</i>	L
Long-tailed Weasel	<i>Mustela frenata</i>	H

Common Name	Scientific Name	Probability of Occurrence ^b
Mink	<i>Mustela vison</i>	H
Eastern Spotted Skunk	<i>Spilogale putorius</i>	M
Striped Skunk	<i>Mephitis mephitis</i>	H
River Otter	<i>Lutra canadensis</i>	L
Bobcat	<i>Lynx rufus</i>	H
White-Tailed Deer ^e	<i>Odocoileus virginianus</i>	H,O

^a From Tennessee Wildlife Resources Agency Files (1993).

^b H=High M=Moderate L=Low O=Observed.

^c Considered sensitive species by the Regional Forester (See TES section).

^d Not on database list, but probably present.

^e Management Indicator Species (See Wildlife section).

G-9
CULTURAL RESOURCES
MOA

MEMORANDUM OF AGREEMENT

This MOA is being submitted, along with a documentation package to the ACHP for review, comment, and ratification.



TENNESSEE HISTORICAL COMMISSION
701 BROADWAY
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
NASHVILLE, TENNESSEE 37243-0442

13 August, 1993

John F. Ramey
Cherokee National Forest
P. O. Box 2010
Cleveland, Tennessee 37320

Re: MEMORANDUM OF AGREEMENT, USFS, OLYMPIC WHITEWATER SLALOM VENUE, X, POLK COUNTY, X

Dear Mr. Ramey:

Pursuant to your request, our office has reviewed the above-referenced document in accordance with regulations codified at 36 CFR 800 (51 FR 31115, September 2, 1986). Based on the information provided, we find that the Memorandum as currently proposed adequately mitigates project effects upon properties eligible for listing in the National Register of Historic Places.

Please submit this signed Memorandum plus all appropriate documentation as delineated at 36 CFR Part 800 to the Advisory Council on Historic Preservation for review. Your cooperation is appreciated.

Sincerely,

Herbert L. Harper
Executive Director and
Deputy State Historic
Preservation Officer

HLH/jyg

MEMORANDUM OF AGREEMENT
SUBMITTED TO THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
PURSUANT TO 36 CFR Part 800.6(a)

WHEREAS, The United States Forest Service Cherokee National Forest (Forest) has determined that the Ocoee Olympics Whitewater Course will have an effect on The Old Copper Road (site 40Pk373), a property; eligible for inclusion in the National Register of Historic Places, and has the potential to affect other unidentified resources eligible for inclusion in the National Register of Historic Places; and

WHEREAS, the Forest has determined that land use changes resulting from this project may have an effect on the degree and type of public use of the Old Copper Road; and

NOW, THEREFORE, the Forest and the Tennessee SHPO agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account the effect of the undertaking on historic properties.

STIPULATIONS

The Forest will ensure that the following measures are carried out.

1. Archaeological Site 40Pk373 (The Old Copper Road).

(a) Rehabilitation/Adaptive Reuse.

The Forest shall consider rehabilitation of the portions of the Old Copper Road within the direct construction impact area to serve necessary transportation and vehicular access needs as dictated by engineering constraints. The Forest shall ensure that the design of the project is compatible with the historic and architectural qualities of the Old Copper Road and is consistent with the recommended approaches to rehabilitation set forth in the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings (U.S. Department of the Interior, National Park Service, 1983).

(b) Historic Preservation Plan.

Within one (1) year of the signing of this agreement, the Forest will develop a Historic Preservation Plan (HPP) for the Old Copper Road in accordance with the standards and guidelines attached as Appendix A. The Forest will ensure that the HPP is developed in consultation with the SHPO.

When the HPP is complete in draft form, the Forest will provide copies of the draft to the SHPO and the Council for review and acceptance. Disagreement or questions about the draft HPP will be resolved through consultation among the parties.

Upon acceptance of the HPP by the SHPO and the Council, the Forest will finalize and implement it in lieu of compliance with 36CFR Part 800.4 through 800.6.

The Forest will prepare a report annually on its implementation of the HPP, and provide this report to the SHPO and Council for review, comment, and consultation as needed.

(c) Recordation.

If the Forest, in consultation with the Tennessee SHPO, determines that rehabilitation of portions of the Old Copper Road as described in Stipulation 1(a) is neither prudent nor feasible, the Forest will ensure that a recordation plan is implemented prior to construction activities in the area. The plan shall include at a minimum the types of information listed in Appendix B.

(d) Monitoring during demolition.

After completion of the requirements listed in Stipulation 1(a-c), the Forest will ensure that an archaeologist meeting the Secretary of the Interior's Professional Qualifications Standards (48 FR 44738-9) monitors removal of or construction on the portion of the Old Copper Road identified in Appendix C. At a minimum, such monitoring will include recording and reporting of major feature or artifact concentrations uncovered, and recovery/curation of a sample of uncovered remains where practicable.

(e) Limited Access.

The Forest shall ensure that access to portions of the Old Copper Road outside the direct project construction area is limited during the Olympic event. Access shall be limited through the use of barricades, fences, or other appropriate techniques.

2. Unidentified Potential Resources.

(a) Survey.

The Forest shall ensure that an archaeological survey of all construction impact areas identified in Appendix C is conducted in a manner consistent with the Secretary of the Interior's Standards and Guidelines for Identification (48 FR 44720-23). The survey shall be conducted in consultation with the SHPO, and a report of the survey, meeting the standards of the SHPO, shall be submitted to the SHPO for review and approval.

(b) Evaluation.

The Forest shall evaluate properties identified through the survey in accordance with 36 CFR Part 800.4(c). If the survey results in the identification of a property that is eligible for the National Register solely under criterion d, the Forest shall ensure that they are treated in accordance with Stipulations 2(c-d). If the survey results in the discovery of a property that is eligible for the National Register for another reason, the Forest shall comply with 36 CFR Part 800.5.

(c) Treatment.

If properties eligible for the National Register solely under criterion d are identified in the archaeological survey described in Stipulation 2(b), The Forest shall ensure that a data recovery plan is developed in consultation with the SHPO for the recovery of archaeological data. The plan shall be consistent with the Secretary of the Interior's Standards and Guidelines for Archaeological Documentation (48 FR 44734-37) and take into account the Council's publication Treatment of Archaeological Properties (Advisory Council on Historic Preservation. (draft) 1980) subject to any pertinent revisions that the Council may make in that publication prior to completion of the data recovery plan, and the SHPO publication Standards and Guidelines for Archaeological Resource Management Studies (Tennessee SHPO 1991). It shall specify at a minimum:

the properties or portions of properties where data recovery; is to be carried out;

the research questions to be addressed through the data recovery, with an explanation of their relevance and importance;

the methods to be used, with an explanation of their relevance to the research questions;

the proposed disposition of recovered materials and records;

proposed methods for disseminating results of the work to the interested public;

a proposed schedule for the submission of progress reports to the SHPO.

3. Treatment of Human Remains.

Although human remains are not expected within the project construction impact area, if human remains are encountered, the provisions of the Cherokee National Forest Action Plan for Human Remains, the USFS Southern and Eastern Regions Policy for Treatment of Human Remains, Council guidance, and the Native American Graves Protection and Repatriation Act (P.L. 101-601: 104 Stat. 3048: 25 USC 3001-13) shall be followed.

4. Reporting

The Forest shall ensure that all final archaeological reports resulting from actions pursuant to this agreement are provided to the SHPO. The Forest shall ensure that all such reports are responsive to contemporary professional standards and to the Department of the Interior's Format Standards for Final Reports of Data Recovery Program (42 FR 5377-79). Precise locational data may be provided only in a separate appendix if it appears that its release could jeopardize archaeological sites.

5. Qualifications.

The Forest shall ensure that all historic research carried out pursuant to this agreement is carried out by or under the direct supervision of a person or persons meeting at a minimum the Secretary of the Interior's Professional Qualifications

standards (48 FR 44730-9) for Historians; and that all archaeological studies are carried out by or under the direct supervision of a person or persons meeting at a minimum the Secretary of the Interior's Professional Qualifications Standards (48 FR 44738-9) for Archaeologists.

6. Curation.

The Forest shall ensure that all materials and records resulting from this agreement are curated by an institution acceptable by the SHPO in accordance with 36 CFR Part 7.9, provided, however, that human remains and grave-associated artifacts will be disposed of as outlined in Stipulation 3.

7. Administrative Concerns.

- (a) Should any party to this agreement object within thirty (30) days after receipt to any plans, specifications, contracts, or other documents provided for review pursuant to this agreement, or to the manner in which this agreement is being implemented, the Forest shall consult with the objecting party to resolve the objection. If the Forest determines that the objection cannot be resolved, the Forest shall forward all documentation relevant to the dispute to the Council. Within thirty (30) days after receipt of all pertinent documentation, the Council will either:

- (1) provide the Forest with recommendations, which the Forest will take into account reaching a final decision regarding the dispute; or
- (2) notify the Forest that it will comment pursuant to 36 CFR Part 800.6(b) and proceed to comment. Any Council comment provided in response to such a request will be taken into account by the Forest in accordance with 36 CFR Part 800.6(c)(2) with reference to the subject of the dispute.

Any recommendation or comment provided by the Council will be understood to pertain only to the subject of the dispute; the Forest responsibility to carry out all actions under this agreement that are not the subjects of the dispute will remain unchanged.

- (b) At any time during implementation of the measures stipulated in this agreement, should an objection to any such measure be raised by a member of the public, the Forest shall take the objection into account and consult as needed with the objecting party, the SHPO, others as needed, and the Council if necessary to resolve the objection.

execution of this Memorandum of Agreement by the Forest and the Tennessee SHPO, its subsequent acceptance by the Council, and the implementation of its terms, evidence that the Forest has afforded the Council an opportunity to comment on the Ocoee Olympics Whitewater Course and its effects on historic properties, and that the Forest has taken into account the effects of the undertaking on historic properties.

UNITED STATES FOREST SERVICE, CHEROKEE NATIONAL FOREST

BY: John F. Ramsey.

DATE: 8/9/93.

TENNESSEE STATE HISTORIC PRESERVATION OFFICER

BY: Herbert L. Hays, DSHPO

DATE: 8/12/93.

ACCEPTED for the Advisory Council on Historic Preservation

BY: _____.

DATE: _____.

The Historic Preservation Plan (HPP) for the Old Copper Road shall be prepared in accordance with the following guidelines.

1. The HPP will be prepared by or under the supervision of an individual who meets, or individuals who meet, at a minimum, the appropriate "professional qualifications standards" in the Secretary of the Interior's Professional Qualifications Standards (48FR 44738-9).

2. The HPP will include the following contents:

a. Foreword: The foreword shall explain the basis upon which the HPP is being prepared.

b. Introduction: The introduction shall explain the organization and use of the various sections of the HPP.

c. Overview: This element of the HPP will synthesize available data on the history, prehistory, architecture, architectural history, landscape architecture, and ethnography of the Old Copper Road and its surrounding area, to provide a context in which to evaluate and consider alternative treatment strategies for different classes of historic properties.

d. Management System. This element of the HPP will establish procedures for the management of the Old Copper Road, including but not limited to:

i. procedures for the use of historic properties for agency purposes or the purposes of others, in a manner that does not cause significant damage to or deterioration of such properties, with reference to the Section 110 guidelines, Section 110(a)(1), Discussion Part b, and specifically providing for monitoring public use of the Old Copper Road after the Olympic Event, including at a minimum:

existing condition of the property prior to construction of the Olympic facilities;

monitoring at specified intervals covering the five (5) years following the conclusion of the Olympic event;

methods of monitoring to be used, with an explanation of their relevance to the monitoring program;

methods of limiting or preventing degradation and damage to the historic property as a result of increased public use;

proposed methods of interpreting or presenting the historical significance of the Old Copper Road to the interested public;

a proposed schedule for submission of monitoring reports to the SHPO, and the Council.

ii. Procedures for affirmatively preserving historic properties, with reference to the Section 110 guidelines, Section 110(a)(1), Discussion Part c.

iii. procedures for the maintenance of historic properties, with reference to the Section 110 Guidelines, Section 110(a)(2). Discussion Part (d)(1)(i).

iv. procedures for the avoidance or mitigation of adverse effects on historic properties, with reference to the Section 110 Guidelines, Section 110(a)(2), Discussion Part d(1)(iii).

v. procedures for consultation with relevant parties during implementation of the HPP, with reference to the Section 110 Guidelines, Part III.

APPENDIX B
RECORDATION PLAN REQUIREMENTS

If required under Stipulation 1(c), recordation shall be conducted in accordance with the following guidelines.

(1) Topographic Mapping.

Production of a detailed topographic map of the existing road, including adjacent topographic features and placement of permanent benchmarks.

(2) Construction Techniques and Associated Features.

Recordation of all significant construction techniques and associated features, including but not limited to:

- star-drill holes;
- day-laid retaining walls;
- bed construction techniques (i.e. stone paving, sand caps, and other relevant features).

Recordation shall include, but not be limited to, photographic documentation, detail drawings, and mapping with reference to (1) above.

(3) Photographic documentation.

Viewscapes and typical features should be recorded in both black-and-white and color slide format of all affected portions of the road from appropriate angles.

A detailed topographic map of the Ocoee River segment. The river flows from the upper left towards the lower right, forming a large meander loop. Area A, outlined with a thick black border, covers a section of the riverbank within the meander. Area B, also outlined with a thick black border, follows a stretch of the river downstream. The map features numerous contour lines indicating elevation, with labels such as 1000, 1200, 1400, 1600, and 1800 feet. Key landmarks include "2 DAM" at the top left, "VA Boating Site", "P.L.R.H. I", "Geo. No. 3 Powerhouse", "Rock Camp Hill", "Fressley", "Coke", "Boyd Gap", "Sneed Top", and "Johnston Branch". Several benchmark points are marked, including BM L.S. 701, BM L.S. 702, BM L.S. 703, BM L.S. 704, BM L.S. 705, BM L.S. 706, BM L.S. 707, BM L.S. 708, BM L.S. 709, BM L.S. 710, BM L.S. 711, BM L.S. 712, BM L.S. 713, BM L.S. 714, BM L.S. 715, BM L.S. 716, BM L.S. 717, BM L.S. 718, BM L.S. 719, BM L.S. 720, BM L.S. 721, BM L.S. 722, BM L.S. 723, BM L.S. 724, BM L.S. 725, BM L.S. 726, BM L.S. 727, BM L.S. 728, BM L.S. 729, BM L.S. 730, BM L.S. 731, BM L.S. 732, BM L.S. 733, BM L.S. 734, BM L.S. 735, BM L.S. 736, BM L.S. 737, BM L.S. 738, BM L.S. 739, BM L.S. 740, BM L.S. 741, BM L.S. 742, BM L.S. 743, BM L.S. 744, BM L.S. 745, BM L.S. 746, BM L.S. 747, BM L.S. 748, BM L.S. 749, BM L.S. 750, BM L.S. 751, BM L.S. 752, BM L.S. 753, BM L.S. 754, BM L.S. 755, BM L.S. 756, BM L.S. 757, BM L.S. 758, BM L.S. 759, BM L.S. 760, BM L.S. 761, BM L.S. 762, BM L.S. 763, BM L.S. 764, BM L.S. 765, BM L.S. 766, BM L.S. 767, BM L.S. 768, BM L.S. 769, BM L.S. 770, BM L.S. 771, BM L.S. 772, BM L.S. 773, BM L.S. 774, BM L.S. 775, BM L.S. 776, BM L.S. 777, BM L.S. 778, BM L.S. 779, BM L.S. 780, BM L.S. 781, BM L.S. 782, BM L.S. 783, BM L.S. 784, BM L.S. 785, BM L.S. 786, BM L.S. 787, BM L.S. 788, BM L.S. 789, BM L.S. 790, BM L.S. 791, BM L.S. 792, BM L.S. 793, BM L.S. 794, BM L.S. 795, BM L.S. 796, BM L.S. 797, BM L.S. 798, BM L.S. 799, BM L.S. 800. Other labels include "G-9-11" at the bottom center and "Ocoee" at the bottom right.



A detailed topographic map of a river segment, identified as the Ocoee River. The map features contour lines indicating elevation, with labels such as 1500, 1600, 1700, 1800, 1900, 2000, and 2100. The river flows from the upper left towards the lower right. Key locations and features include:

- 2 DAM** at the top left.
- VA Boating Site** near the top left.
- Quadr No 3 Powerhouse** on the left bank.
- 3 LANE RIVER** crossing the main river.
- CHC 2** and **CHC 3** (Copper Hill Camp) on the right bank.
- BM LRR 5** (Benchmark Little Rock River) near the bottom center.
- BM OSR 4** and **BM OSR 5** (Benchmark Old Stone River) near the bottom center.
- Boyd Gap Observation Site** on the right bank.
- JOHNS CREEK** and **SWEET CREEK** tributaries at the bottom.
- OCOE** (Ocoee) written vertically on the right side.
- Mile 30** at the bottom center.
- G-9-11** at the bottom center.

 The map also shows various trails, roads, and landmarks like **Rock Camp** and **Williams**. A shaded area labeled **(a)** indicates the construction impact area, and a line labeled **(b)** indicates the survey area along the river segment.

APPENDIX H PERMITTING REQUIREMENTS

In order to construct the venue and hold the event, various federal, state, and local permits will be required. A number of permits will be required to construct the venue and hold the Olympic event.

Air Emissions - The Clean Air Act (CAA) as amended in August 1977 and November 1990 provides the basis for regulating air pollution to the ambient atmosphere. The U.S. Environmental Protection Agency (EPA) has set national ambient air quality standards (NAAQS), which Tennessee has also adopted as their standard. The Tennessee Department of Environment and Conservation (TDEC) is charged with enforcing those standards and requiring permits to be issued for potential polluting activities.

Tennessee regulates only stationary sources of the criteria pollutants, certain volatile organic compounds, and specific air pollutants designated as hazardous. While Tennessee has the statutory authority to regulate mobile sources, there are no regulations promulgated by the State for the control of mobile source exhaust emissions in Polk County. If however, the TDEC found that the ambient air quality standards set for the protection of public health were being exceeded due to vehicle emissions they would take action to arrest the threat. Rule 1200-3-.01(4) directs the State to seek an equitable economic balance when the problems are aesthetic in nature. Tennessee also controls fugitive dust and requires preventive measures be taken to limit particulate matter from becoming airborne. The developer of the venue must take measures to avoid fugitive dust. The developer is also prohibited from open burning in the National Forest. As the venue does not contain a stationary source of emissions, there are no permits required for either construction or operation. However, since such construction has the potential to create fugitive dust problems and since tailpipe emissions from the increased vehicle traffic prior to and during the event could cause increased ambient pollutant concentrations, TDEC is mindful that the project has the potential to create ambient air quality problems if it is not properly managed.

Biological Resources - No permits will be required regarding biological resources.

Endangered Species - Consultation with the USFWS is required for effects to TES. In compliance with Section 7 of the Endangered Species Act of 1973, the Forest Service has prepared a Biological Assessment (Appendix I) for the proposed project. A Biological Evaluation was also prepared and included in Appendix I which assesses possible effects on sensitive species.

Surface Water/Navigation - The proposed placement of dredge/fill material into the Ocoee River will require a Department of the Army (DA) Permit pursuant to Section 10 of the Rivers and Harbors Act of 1989 and Section 404 of the Clean Water Act (CWA). In addition, structures and/or work in or affecting the Ocoee River will require a DA permit pursuant to Section 10. Before a permit can be issued, certification must be provided by the State of Tennessee, Department of Health and Environment, pursuant to

Section 401(a)(1) of the CWA, that applicable water quality standards will not be violated. A DA permit will be granted unless the District Engineer determines that it would be contrary to the public interest. This permit will be administered by the Nashville District of the U.S. Army Corps of Engineers. The State of Tennessee is also required to certify through the 404 permit process that applicable state water quality standards will be met. The TDEC is responsible for certification and permit issuance. As part of the Section 404 permit, TVA will also issue a 26a permit as required by Section 26a of the Tennessee Valley Authority Act of 1933. This section gives TVA the authority to review development in the floodplain of its rivers. TVA has also agreed to provide the venue with adequate water flow to accommodate the Olympic event and other events leading up to the Olympic event. The state considers compliance with the federal requirements as complying with the Tennessee Water Quality Control Act requirements for an Aquatic Resource Alteration Permit. However, if any tributaries are effected, an Aquatic Resource Alteration Permit (ARAP) will be required, under the Tennessee Water Quality Control Act. ARAP permits will also be required for the bridge crossings and utility line crossings.

A "No-Rise" certification, signed and sealed by a professional engineer will have to be submitted prior to any construction or fill, since the proposed competitive channel would be located in a regulatory floodway. The process for submitting and obtaining approval for a "No-Rise" certification includes obtaining a specific computer model from FEMA in Atlanta, Georgia; performing model runs on the site-specific existing conditions and on the proposed conditions in order to indicate the 100-year floodway elevations; and submitting the "no-rise" supporting data and a copy of the engineering certification to the appropriate Polk County community official, who will then issue a permit. The No-Rise regulations are issued by FEMA, who also determines the areas susceptible to flooding, issues the flood maps, and provides assistance to the local government, if needed. The local community government (in this case, Polk County) issues the No-Rise permit, regulates and enforces the FEMA regulations. The "no-rise" certification certifies that the proposed development will not impact the 100-year flood elevations, floodway elevations, and floodway widths on the waterway (Ocoee River, in this case).

Stormwater - The rules of the Tennessee Department of Public Health, Bureau of Environmental Health Services Division of Water Quality Control, Chapter 1200-4-10-.05 address the General NPDES permit for storm water discharges associated with construction activity. The rule addresses discharges of stormwater runoff from land disturbed by construction activity, including clearing, grading excavation, except operations that result in the disturbance of less than five acres of total land area. The person who engages in or contracts for, intends to engage in or contract for, construction activity that disturbs at least five acres of land must submit a Notice of Intent of the Division to obtain coverage under this rule. The construction activity must be covered by a written, site-specific plan to minimize erosion of soil and the discharge of other pollutants into water of the State. The plan must describe construction management techniques and sediment and erosion controls appropriate for the activity and set forth a schedule for implementing each such controls. The plan must describe construction site

planning and permanent measures that will minimize the discharge of pollutants via storm water discharges after construction operations have been finished.

Ground Water - The State of Tennessee Regulations to Govern Subsurface Sewage, Chapter 1200-1-6, requires a permit for subsurface sewage disposal. Permits would be filed through the Polk County Health Department. The Tennessee Division of Water Supply will issue a permit for site approval and construction plans for the potable water supply well. The water system must meet the criteria of a non-transient, non-community water system. If withdrawals are greater than 50,000 gallons per day, the Division must be notified.

Wastewater - The Tennessee Division of Water Pollution Control requires site and construction plan approval for the wastewater pump and haul system, as well as operating approval.

The Tennessee Water Quality Control Act of 1977 (including the 1987 amendments) of the Tennessee Department of Health and Environment requires that State Operating Permits be issued for the construction, installation, modification, or operation of any treatment works or extension or addition to the system. This applies to sewerage systems where any portion of the process is exposed to stormwater or if there is any potential to discharge to waters of the state. The State Operating Permit covers land application systems; non-discharging lagoons and ponds; pump and haul operations; and wastewater recycling operations and is issued through the Tennessee Department of Health and Environment, Division of Water Quality Control.

Also, if there is any discharge from the potable water supply well treatment system, a discharge permit is needed from the Water Pollution Control Division. The Tennessee Division of Ground Water Protection must review the site and construction plans for the subsurface sewage disposal system.

Transportation - The Tennessee Department of Transportation requires that a written request for temporary lane closure be submitted to the Director of Engineering at the Chattanooga District office. A plan showing the proposed lane closures must be included with the request. The Tennessee Highway Patrol will assist with traffic control, as needed. A letter requesting Highway Patrol assistance should be sent to the Commissioner of the Department of Safety in Nashville. Buses that will be used for the shuttle and are not currently registered in Tennessee will need to obtain an apportioned registration. This registration can be obtained from the Department of Motor Vehicles registrar in the bus' home state.

Cultural Resources - When archaeological investigations are proposed for Forest Service lands, and the Forest Service is not the proponent of the project, a permit is required. Permitting regulations and requirements are defined by the Archaeological Resource Protect Act (ARPA) of 1979, as amended. When the Forest Service is the proponent of or partner to, the proposed project, no permit is required. In either case, archaeological site survey, recordation, evaluation, protection and enhancement is performed in accordance with Forest Service guidelines. These are defined in FSM2360,

which also define the authority. For the Cherokee National Forest, these regulatory criteria for the management of cultural resources are submitted in Management Area 11 (culture resource sites) of the Forest Land and Resource Management Plan.

In any event, when activities on Forest Service lands may effect significant cultural resources, in accordance with the Section 106 process of the NHPA (36 CFR 800.3), a determination of the proposed effect (i.e., no effect, adverse effect, no adverse effect) to significant cultural resources must be submitted to the Tennessee SHPO for review and comment. When an effected site is listed on or eligible for listing in the NRHP (36 CFR 60.4) the right to review and comment must also be extended to the ACHP. Mitigation measures for adverse effects to NRHP sites are then determined in consultation between the Forest Service, the Tennessee SHPO and the ACHP. These mitigation measures are formalized in a MOA in which all parties are signatories.

Local Regulations - According to Polk County officials, a building permit would be required if Volunteer Electric will supply power to the venue. Also, the construction company will need a contractors building license issued by Polk County to construct the venue. The Polk County Health Department issues permits for food service vendors. No other local permits will be required.

Other Permits - The U.S. Forest Service will need to provide the International Olympic Committee with a permit to use the venue for a certain period of time.

APPENDIX I

Biological Assessment and Biological Evaluation

100-10754

100-10754-100

100-10754-100

100-10754-100

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Reply To: 2670

Date: October 27, 1993

Subject: Biological Assessment for the Olympic White-water Events

To: Forest Supervisor

In compliance with Section 7 of the Endangered Species Act of 1973, I have conducted a Biological Assessment (B.A.) for this proposed project and have attached it to this memo.

/s/ J.Herrig

JIM HERRIG
Forest Biologist

cc: Jim Widlak, USF&WS

BIOLOGICAL ASSESSMENT
CHEROKEE NATIONAL FOREST
OLYMPIC WHITEWATER VENUE

1. Introduction

This biological assessment (BA) evaluates possible effects on Proposed, Endangered and Threatened (PET) species for an Environmental Impact Statement (EIS) that is being conducted for a proposed project to design and construct a canoe and kayak whitewater course on the Ocoee River, Cherokee National Forest, Polk County, Tennessee. The course would be the site of the Olympic Whitewater Venue during August, 1996.

2. Species

A list of rare species, with map locations, was provided by the Tennessee Department of Environment and Conservation. The Tennessee Wildlife Resources Agency provided lists of all known vertebrate species found in Polk County. The U.S. Fish and Wildlife Service recommended one endangered and 3 candidate species be evaluated. From these references a list of rare species likely to occur or to have habitat within the general area was developed (see Table 1). Three federally listed species of animals and one plant were identified for evaluation. The evaluation of Forest Service Sensitive species which includes federal candidates and state listed species is contained in the attached Biological Evaluation.

After reviewing the habitat characteristics of the venue area and evaluating the likely area for effects, the Bald Eagle and the Carolina Northern Flying Squirrel were dropped from further consideration. The Bald Eagle is known to occur in the vicinity of Parksville Lake during the winter months. The nearest active nest site is approximately 40 away. Suitable habitat for the Bald Eagle does not exist within the venue area and impacts from the Olympic event will not effect this species. The Carolina Northern Flying Squirrel occurs at high (>4800 feet) elevation in spruce-fir or northern hardwoods. The closest suitable habitat is over 25 miles to the northeast. There will be no direct, indirect or cumulative effects to this species from the activities covered by this EIS.

3. Program

Design and construct a canoe and kayak whitewater course on the Ocoee River.

4. Location

Ocoee River, Cherokee National Forest, Polk County, Tennessee. The proposed Olympic venue site is located 6 miles northeast of Ducktown, TN along U.S. Highway 64. Elevation at the proposed site is approximately 1200 feet.

5. Status of Species and Habitat in Project Area

Red-cockaded Woodpecker

The red-cockaded woodpecker is listed as Federally Endangered throughout its range (Federal Register 10/13/70), which includes scattered locations throughout the southeast. Its decline is attributed primarily to the reduction of its basic habitat requirement: open stands of pine sixty years and older. Living pines of this age infected with red-heart disease provide the RCW with nesting sites.

Presently, there are two colonies, 1 active and 1 inactive, on the Cherokee National Forest. Both are located in the vicinity of Parksville Lake, Polk County, Tennessee.

The Olympic venue is approximately 10 miles from the colonies, and is separated from them by the expanse of Parksville Lake. The distance acts as a barrier to RCW utilization of the project area; RCWs forage up to 1/2 mile from their colony. Potential habitat in the project area exists, but is extremely marginal in suitability due to the hardwood component in the overstory and midstory.

A ground survey of all stands suitable for Red-cockaded woodpecker nesting habitat was conducted by experienced biologists who followed transects through these stands. No evidence of current or past occupation by this species was found.

Ruth's Golden Aster

Two populations of Ruth's Golden Aster are known to exist; both are located on the Cherokee National Forest. The largest population occurs on the Hiwassee River. It contains over 10,000 individual plants and is considered to be stable to decreasing.

The Ocoee River population contains about 500 individuals distributed among six sites all located between Ocoee Powerhouses 2 and 3. This population is considered to be decreasing.

Ruth's Golden Aster benefits from periodic floods that remove shading and competing vegetation. Stream flows within both the Hiwassee and Ocoee Rivers are currently regulated by upstream reservoirs. Habitat loss is attributed to encroachment by plant species that have been able to invade the area as a result of flow regulation.

Another threat to the species is trampling or picking by people. The Hiwassee River population is fairly inaccessible. All approaches to the sites require hiking along a trail or railroad tracks. Only a few hikers and anglers regularly utilize the area. All of the sites in the Ocoee River population are located along US Hwy 64. This stretch of the river is a very popular area for both private and commercial rafting. The six Ocoee River sites are exposed not only to thousands of rafters but also to many site-seers who park beside the road and walk down to the river.

A botanical survey of the Ocoee River gorge was conducted during September and October, 1991 with a follow-up survey for early blooming species in May, 1992. No evidence of Ruth's Golden Aster was found within the project area or immediately down stream.

Other Species

While conducting the biological and botanical surveys for the Red-cockaded woodpecker and Ruth's Golden Aster, the researchers looked for evidence of other Threatened and Endangered species. Additionally, aquatic surveys for fish were conducted using standard electrofishing techniques in the shallow streams and SCUBA diving in the deep "Blue Hole". Macroinvertebrates were sampled using D-frame kick nets. No previously undetected Threatened or Endangered species or habitat for them was found.

Table 1. Threatened, Endangered, Proposed and Sensitive Species or habitat in the vicinity of the proposed Olympic venue.

COMMON NAME	SCIENTIFIC NAME	FED	ST
Red-cockaded Woodpecker	<i>Picoides borealis</i>	E	E
Bald Eagle	<i>Haliaeetus leucocephalus</i>	E	E
Carolina No. Flying Squirrel	<i>Glaucomys sabrinus coloratus</i>	E	E
Ruth's Golden-aster	<i>Pityopsis ruthii</i>	E	E
Chalk Maple	<i>Acer saccharum leucoderme</i>	~	S
Cow-parsnip	<i>Heracleum maximum</i>	~	S
Broadleaf Tickseed	<i>Coreopsis latifolia</i>	C3C	E
Roan Mt. Rattlesnake-root	<i>Prenanthes roanensis</i>	C3C	T
Southern Lobelia	<i>Lobelia amoena</i>	~	S
No. Bush-honeysuckle	<i>Diervilla lonicera</i>	~	T
Mt. Bush-honeysuckle	<i>Diervilla sessilifolia ri</i>	~	T
Mt. Honeysuckle	<i>Lonicera dioica</i>	~	S
Catch-fly	<i>Silene ovata</i>	C2	T
Nevius' Stonecrop	<i>Sedum nevii</i>	C2	E
Large Cranberry	<i>Vaccinium macrocarpon</i>	~	T
Bush Pea	<i>Thermopsis fraxinifolia</i>	~	T
Giant Hyssop	<i>Agastache scrophulariifol</i>	~	S
So. Nodding Trillium	<i>Trillium rugelii</i>	~	E
Pink Lady's Slipper	<i>Cypripedium acaule</i>	~	E
Fraser's Loosestrife	<i>Lysimachia fraseri</i>	C2	E
Choke Cherry	<i>Prunus virginiana</i>	~	S
Goldeneye Saxifrage	<i>Saxifraga careyana</i>	C3C	S
Horse-sugar	<i>Symplocos tinctoria</i>	~	S
American Osprey	<i>Pandion haliaetus</i>	~	E
Tennessee Dace	<i>Phoxinus tennesseensis</i>	~	S
Star-nosed Mole	<i>Condylura cristata parva</i>	C3C	S
Hairy-tailed Mole	<i>Parascalops brewerii</i>	~	S
Southern Water Shrew	<i>Sorex palustris punctatus</i>	C2	S
New Eng. Cottontail Rabbit	<i>Sylvilagus transitionalis</i>	C2	S
Least Weasel	<i>Mustela nivalis</i>	~	S
Ocoee Covert Snail	<i>Mesodon archeri</i>	C3C	~

FED - Federal Status, E = Endangered, C2 and C3C are Candidates,

~ = No federal status but is a Sensitive species.

ST - State Status, E = Endangered, T = Threatened, S = Special Concern, ~ = No state status.

6) Proposed Action

The Forest Service proposes, on behalf of the State of Tennessee, to design and construct a canoe and kayak whitewater course on the Ocoee River. In addition to the physical development of the course within the channel of the Ocoee River, proposed improvements include visitor facilities, an Olympic Village, spectator viewing areas, footbridges over the river, and other temporary and permanent supporting facilities.

Three action alternatives and a No Action alternative are evaluated in the Environmental Impact Statement. Selection of the No Action alternative would mean that no whitewater course or support facilities would be built for the 1996 Olympics. Selection of any of the action alternatives would mean that the a whitewater course and some compliment of support facilities would be constructed at the Ocoee River site.

The three action alternatives are described as the Temporary, Temporary/Permanent, and Permanent alternatives. Under the Temporary (T) alternative all facilities and the competitive channel would be removed after the event. The site would revert to a state that is similar to the present condition. Under the Temporary/Permanent (T/P) and Permanent (P) alternatives, the competitive channel would remain in place as would many of the support facilities. The significant differences between these latter two alternatives are: 1) in the T/P alternative the temporary bleachers for the spectator seating are mounted on concrete supports that are removed following the event while in the P alternative the temporary bleachers are mounted on a terraced bank that will remain in place; 2) a "lower" bridge may be constructed after the event and left in place under the P alternative; 3) the acres of ground disturbance in the T alternative is expected to be 7 compared to 11 and 12 acres in the T/P and P alternatives; and 4) the gross square feet of the day use building will be 16,740 under the P alternative as opposed to 13,920 square feet in the T/P alternative.

7) Other Activities

General recreational activities will continue in the area. Some increase in visitors is expected. Other forest management activities including wildlife and timber management will continue.

8) Effect on Species and Habitat

Direct Effects

The Red-cockaded woodpecker will not be directly impacted by this project. In all three of the action alternatives the amount of ground disturbance ranges from 7 to 13 acres. All of the stands within the area of development are dominated by hardwoods except the stand where the building is proposed to be located. This latter stand is dominated by Virginia Pine but the trees are not old enough to support cavities for Red-cockaded woodpeckers.

No Ruth's Golden Aster plants are located within the area of development. Stream flows through the section of river that contains the Ruth's Golden Aster will not be changed significantly from recent levels that support the current rafting industry. No direct effects from this project will occur to this species.

Indirect and Cumulative Effects

The removal of the 7 to 13 acres of immature Virginia Pine will not have any indirect effects on the Red-cockaded woodpecker. Although these trees are suitable for foraging no active colonies were found within the three quarters of a mile - the normal foraging area for this species. Other activities that would result in a reduction in foraging habitat (especially timber sales) are evaluated independently and the cumulative effects are assessed. The timber harvest level for pine species is not projected to remove a significant amount of the foraging habitat. There will be no indirect or cumulative effects on the Red-cockaded woodpecker.

Indirect and cumulative effects to Ruth's Golden Aster could result from an increase in both rafters and site-seers along the river. This increase in visitors would be expected as the Ocoee River is exposed to national publicity. In order to insure that no effects occur the following mitigation measures will be employed.

Mitigation Measures for the Protection of Ruth's Golden Aster

Descriptions of the individual site locations are not given in this document in order to protect the species from collectors. Location descriptions are available at the Cherokee National Forest Supervisor's Office.

Site #1

This location does not lend itself to being impacted because of the terrain. Mitigation will consist of monitoring the site for use by recreationists.

Site #2

This location is a large boulder on the near side of the river that is being accessed by visitors who park along the road and follow the steep trail down to the river. The Ruth's Golden Aster plants on the boulder are particularly vulnerable to trampling and picking. Mitigation will consist of blocking the trail and placing a sign indicating that the area is Biologically Sensitive and people are asked to stay out.

Site #3

This location is also a large boulder on the near side of the river. A trail to the boulder does not exist; at rafting flow levels the river separates the boulder from the road fill slope. Access by visitors on the road would be difficult since the bank is extremely steep; access by rafters is unlikely due to the nature of the rapids. Although a threat may be present here, the botanists felt that the site should be monitored without any restrictions on access. If the monitoring demonstrates that harm may be occurring at this site, then access will be restricted.

Site #4

This location is also a large boulder but it is located near the opposite bank. Access to the boulder is unlikely for either rafters or other visitors except during emergency situations (i.e. someone falls out of the raft). Mitigation will consist of monitoring the site for use by recreationists.

Site #5

This location is a flat, bedrock section on the near side of the river. It is an extremely popular place for visitors to sun-bathe, swim and watch the rafters and kayakers go by. Several Ruth's Golden Aster plants are distributed throughout the area. Mitigation will consist of placing signs around the habitat that contains the Ruth's Golden Aster plants. The signs will indicate that the area is Biologically Sensitive and people are asked to stay out. People using the site will be monitored to see if they stay out of the location where the plants occur.

Site #6

Three bedrock ridges in the river channel all have Ruth's Golden Aster plants present or habitat capable of supporting the species. The ridges are popular stopping places for rafters and for photographers. Mitigation will consist of requesting the commercial outfitters to stay off these ridges and placing signs along the road. The signs will indicate that the area is Biologically Sensitive and people are asked to stay out. The site will be monitored to see if people stay out of the location where the plants occur.

In addition the site specific mitigation measures described above, the following general provisions will be implemented: 1) Commercial outfitters will be informed of the Ruth's Golden Aster and asked to keep their clients off specified areas; 2) A sign placed at the "put-in" will identify the Ocoee River as having Biologically Sensitive areas that should be avoided; and 3) A cooperative monitoring effort between USDA Forest Service, Tennessee Valley Authority, and Tennessee Department of Environment and Conservation will be implemented to evaluate the effectiveness of the site specific mitigation measures.

9) Consultation with Others and References

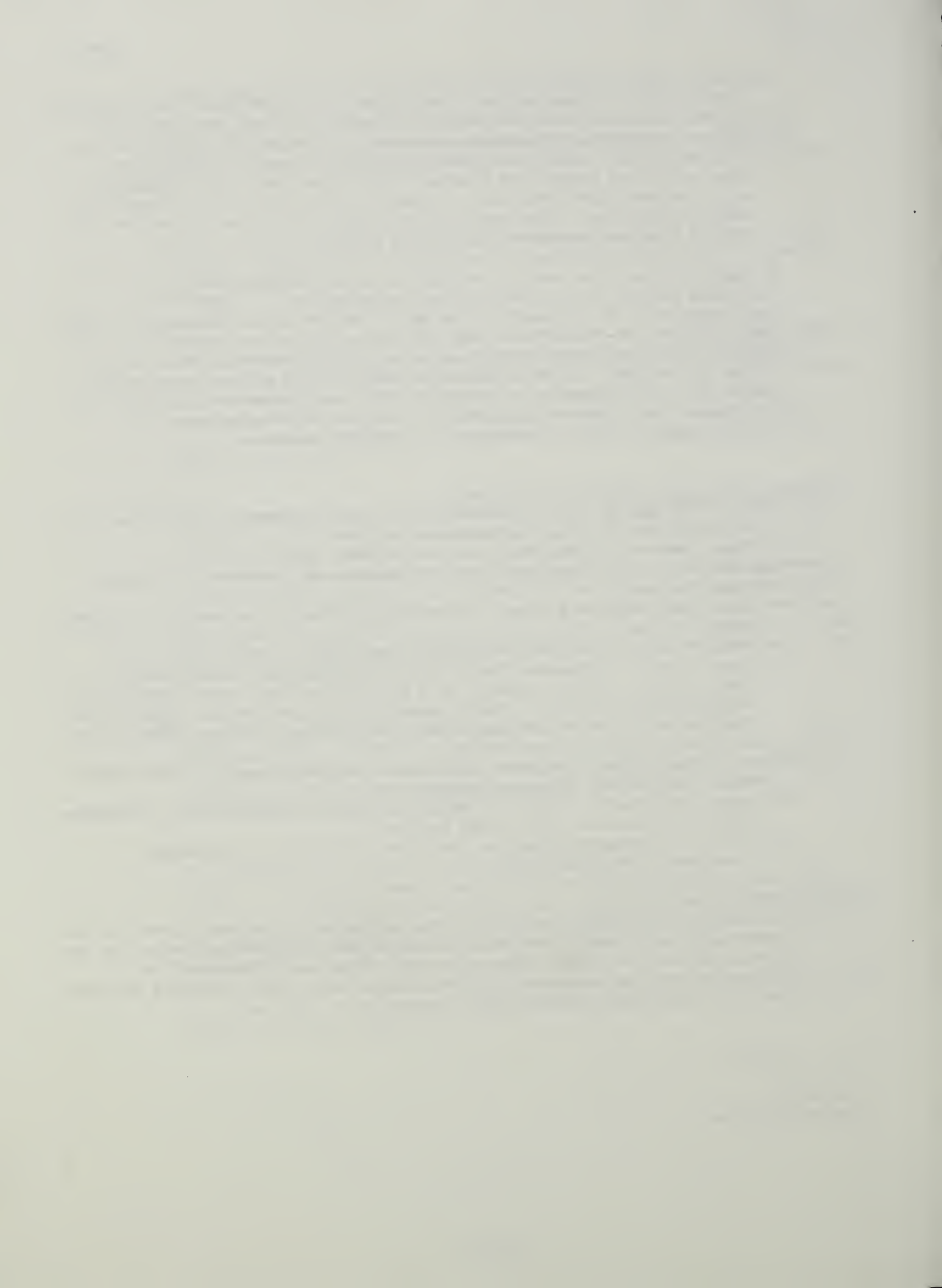
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 Shea, Andrea. 1993. Botanist with Tennessee Department of Environment and Conservation. Personal Communication.
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 Widlak, Jim, Endangered Species Biologist, USDI Fish and Wildlife Service, Cookeville, TN.

10) Determination of Effect

The design and construction of a canoe and kayak whitewater course on the Ocoee River will not effect the Endangered Red-cockaded woodpecker or the Endangered Ruth's Golden Aster. No other Proposed, Threatened or Endangered species occur within the project area. USDI Fish and Wildlife Service concurrence is required.

/s/ J. Herrig

JIM HERRIG
 Forest Biologist



Reply To: 2670

Date: October 27, 1993

Subject: Biological Evaluation for the Olympic White-water Events

To: Forest Supervisor

In compliance with FSM 2670, I have conducted a Biological Evaluation (B.E.) for this proposed project and have attached it to this memo.

/s/ J.Herrig

JIM HERRIG
Forest Biologist

cc: Jim Widlak, USF&WS

BIOLOGICAL EVALUATION
CHEROKEE NATIONAL FOREST
OLYMPIC WHITEWATER VENUE

1. Introduction

This biological evaluation (BE) assesses possible effects on Sensitive species for an Environmental Impact Statement (EIS) that is being conducted for a proposed project to design and construct a canoe and kayak whitewater course on the Ocoee River, Cherokee National Forest, Polk County, Tennessee. The course would be the site of the Olympic Whitewater Venue during August, 1996.

2. Species

A list of rare species, with map locations, was provided by the Tennessee Department of Environment and Conservation. The Tennessee Wildlife Resources Agency provided lists of all known vertebrate species found in Polk County. The U.S. Fish and Wildlife Service recommended one endangered and 3 candidate species be evaluated. From these references a list of rare species likely to occur or to have habitat within the general area was developed (see Table 1). The evaluation of Forest Service Sensitive species which includes federal candidates and state listed species is contained within this report. Three federally listed species of animals and one plant were identified for evaluation; they are addressed in the attached Biological Assessment.

After reviewing the habitat characteristics of the venue and evaluating the likely area for effects, some of the sensitive species that occur within Polk County were dropped from further consideration. The following species are known in Polk County only from the high elevation habitat associated with Big Frog Mountain: Cow-parsnip, Broadleaf Tickseed, Roan Mountain Rattlesnake Root, Northern Bush-honeysuckle, Mountain Honey-suckle, Catch-fly, Bush Pea, Giant Hyssop, Choke Cherry, Star-nosed Mole, Hairy-tailed Mole, Southern Water Shrew, New England Cottontail Rabbit, and Least Weasel. Large Cranberry, is restricted to very specific bog habitat and is known in Polk County only from the vicinity of Ducktown. No suitable habitat for this species is found within the venue. The American Osprey feeds almost exclusively on fish and nests along large streams and lakes. The Ocoee River does not support enough fish to provide a forage base for Osprey. The Tennessee Dace is found in small (less than 30 feet wide) streams with low (usually less than 2%) gradients. The Ocoee River would be too large for this species if it contained water year-round and the tributaries (Williams, Laurel and Rock Creek) have too steep of gradients to support the Tennessee Dace.

3. Program

Design and construct a canoe and kayak whitewater course on the Ocoee River.

4. Location

Ocoee River, Cherokee National Forest, Polk County, Tennessee. The proposed Olympic venue is located 6 miles northeast of Ducktown, TN along U.S. Highway 64. Elevation at the proposed site is approximately 1200 feet.

Table 1. Threatened, Endangered, Proposed and Sensitive Species known from or with habitat in the vicinity of the proposed Olympic venue.

COMMON NAME	SCIENTIFIC NAME	FED	ST
Red-cockaded Woodpecker	<i>Picoides borealis</i>	E	E
Bald Eagle	<i>Haliaeetus leucocephalus</i>	E	E
Carolina No. Flying Squirrel	<i>Glaucomys sabrinus coloratus</i>	E	E
Ruth's Golden-aster	<i>Pityopsis ruthii</i>	E	E
Chalk Maple	<i>Acer saccharum leucoderme</i>	~	S
Cow-parsnip	<i>Heracleum maximum</i>	~	S
Broadleaf Tickseed	<i>Coreopsis latifolia</i>	C3C	E
Roan Mt. Rattlesnake-root	<i>Prenanthes roanensis</i>	C3C	T
Southern Lobelia	<i>Lobelia amoena</i>	~	S
No. Bush-honeysuckle	<i>Diervilla lonicera</i>	~	T
Mt. Bush-honeysuckle	<i>Diervilla sessilifolia rivularis</i>	~	T
Mt. Honeysuckle	<i>Lonicera dioica</i>	~	S
Catch-fly	<i>Silene ovata</i>	C2	T
Nevius' Stonecrop	<i>Sedum nevii</i>	C2	E
Large Cranberry	<i>Vaccinium macrocarpon</i>	~	T
Bush Pea	<i>Thermopsis fraxinifolia</i>	~	T
Giant Hyssop	<i>Agastache scrophulariifolia</i>	~	S
So. Nodding Trillium	<i>Trillium rugelii</i>	~	E
Pink Lady's Slipper	<i>Cypripedium acaule</i>	~	E
Fraser's Loosestrife	<i>Lysimachia fraseri</i>	C2	E
Choke Cherry	<i>Prunus virginiana</i>	~	S
Goldeneye Saxifrage	<i>Saxifraga careyana</i>	C3C	S
Horse-sugar	<i>Symplocos tinctoria</i>	~	S
American Osprey	<i>Pandion haliaetus</i>	~	E
Tennessee Dace	<i>Phoxinus tennesseensis</i>	~	S
Star-nosed Mole	<i>Condylura cristata parva</i>	C3C	S
Hairy-tailed Mole	<i>Parascalops breweri</i>	~	S
Southern Water Shrew	<i>Sorex palustris punctatus</i>	C2	S
New Eng. Cottontail Rabbit	<i>Sylvilagus transitionalis</i>	C2	S
Least Weasel	<i>Mustela nivalis</i>	~	S
Ocoee Covert Snail	<i>Mesodon archeri</i>	C3C	~

FED - Federal Status, E = Endangered, C2 and C3C are Candidates,
 ~ = No federal status but is a Sensitive species.

ST - State Status, E = Endangered, T = Threatened, S = Special
 Concern, ~ = No state status.

5. Habitat in Project Area

The Olympic venue is characterized by dry ridgetops in early stages of regenerating pine and hardwoods. There is a transition from pine to hardwoods on the mesic slopes. Exposed rock outcrops with small seeps are present. A powerline right-of way is maintained in a very early stage of regeneration; a major highway with grassy shoulders and parking facilities is present. Deeply incised valleys that are densely vegetated with rhododendron and mountain laurel connect the ridges to alluvial flats at the Ocoee River. The main valley has a well developed riparian area and many wetland features associated with abandoned segments of the river channel and beaver ponds.

6. Status of Sensitive Species Found in the Project Area

Terrestrial biological surveys were conducted at the venue and in the surrounding area. The researchers looked for evidence of Threatened, Endangered and Sensitive species. Additionally, aquatic surveys for fish were conducted using standard electrofishing techniques in the shallow streams and SCUBA diving in the deep "Blue Hole". Macroinvertebrates were sampled using D-frame kick nets.

Botanical surveys of the Ocoee River gorge were conducted during September and October, 1991 with a follow-up survey for early blooming species in May, 1992. The following species were found within the venue or area of expected impacts.

Chalk Maple

Flowers Mar-Apr; moist woods along rivers and ravines. Six occurrences are documented outside of the venue.

Southern Lobelia

Flowers Sep-Oct; open, moist disturbed sites; roadsides; marshes; wet cliffs; river/stream banks and islands. About 50 plants are scattered in a wet seep within the venue. Three other occurrences are documented outside of the venue.

Mountain Bush-honeysuckle

Flowers Jun-Jul; dry, rocky woods; dry river bluffs (Nolichucky and Ocoee Rivers). Two occurrences are documented outside of the venue.

Nevius' Stonecrop

Flowers Apr-May; open, rocky sites (dolomites, limestone, calcareous shale); shallow, soil filled crevices in loose rocky banks; mixed hardwood forests of ravines and river bluffs. Five occurrences are documented outside of the venue.

Southern Nodding Trillium

Flowers Apr-May; rich woods, often with rosebay rhododendron. No occurrences are documented inside or outside of the venue; however, habitat does exist.

Pink Lady's Slipper

Flowers Apr-Jun; dry woods; pine or pine-heath forests; swamps and bogs; sand dunes; acidic soil; low to mid elevation. A few plants are scattered in the low woods along the bank of the Ocoee River within the venue. Three other occurrences are documented outside of the venue.

Fraser's Loosestrife

Flowers May-Jun; meadows; roadsides. Three occurrences are documented outside of the venue.

Goldeneye Saxifrage

Flowers May-Jun; open to partially shaded, moist woods; mixed pine, hardwood, hemlock forest; seeps; moist, acidic rocks (phyllites, shales, granites) of steep slopes; cliffs and ledges; boulders and banks of plunging streams; occasionally small clearings; high, nearly constant moisture. Three occurrences are documented outside of the venue.

Horse-sugar

Flowers Apr-May; moist to dry woodlands; bluffs and ravines. Two occurrences, one containing about 15 plants and the other containing less than 12 plants, are located in low, wet woods within the venue. Thirteen other occurrences are documented outside of the venue.

Ocoee Covert Snail

This terrestrial snail was originally known from only one locality along Goforth Creek. The U.S. Fish and Wildlife Service made it a candidate (C2) for listing but later down graded it to a C3c after additional populations were discovered. The species is associated with moist, talus slopes under a dense canopy. No occurrences are documented inside or outside of the venue; however, habitat does exist near the venue.

7) Proposed Action

The Forest Service proposes, on behalf of the State of Tennessee, to design and construct a canoe and kayak whitewater course on the Ocoee River. In addition to the physical development of the course within the channel of the Ocoee River, proposed improvements include visitor facilities, an Olympic Village, spectator viewing areas, footbridges over the river, and other temporary and permanent support facilities.

Three action alternatives and a No Action alternative are evaluated in the Environmental Impact Statement. Selection of the No Action alternative would mean that no whitewater course or support facilities would be built for the 1996 Olympics. Selection of any of the action alternatives would mean that the a whitewater course and some compliment of support facilities would be constructed at the Ocoee River site.

The three action alternatives are described as the Temporary, Temporary/Permanent, and Permanent alternatives. Under the Temporary (T) alternative all facilities and the competitive channel would be removed after the event. The site would revert to a state that is similar to the present condition. Under the Temporary/Permanent (T/P) and Permanent (P) alternatives, the competitive channel would remain in place as would many of the support facilities. The significant differences between these latter two alternatives are: 1) in the T/P alternative the temporary bleachers for the spectator seating are mounted on concrete supports that are removed following the event while in the P alternative the temporary bleachers are mounted on a terraced bank that will remain in place; 2) a "lower" bridge may be constructed after the event and left in place under the P alternative; 3) the acres of ground disturbance in the T alternative is expected to be 7 compared to 11 and 12 acres in the T/P and P alternatives; and 4) the gross square feet of the day use building will be 16,740 under the P alternative as opposed to 13,920 square feet in the T/P alternative.

8) Other Activities

General recreational activities will continue in the area. Some increase in visitors is expected. Other forest management activities including wildlife and timber management will continue.

9) Effect on Species and HabitatDirect Effects

Sensitive plants are present in four areas where ground disturbing activities will be taking place. The occurrences include about 50 Southern Lobelia, a few (no count was made during the survey) Pink Lady's Slippers, and two separate clusters of Horse Sugar that contain about 15 and 12 plants each. All of these occurrences are associated with wet areas. Development within seeps or other wet areas is unlikely; however, the locations of all of these plants should be marked.

During the layout and construction of the facilities, the habitat around these plants should be protected from disturbances such as vehicular traffic, changes in light regime, or changes in ground water flow. If the plants are located in an area designated for disturbance, then the area should be changed. If there is no option for changing the area of disturbance, then those plants that can be expected to survive should be transplanted. Pink Lady's Slipper will not transplant successfully.

The Ocoee Covert Snail may exist within the venue. Construction activities would destroy a few individuals from this population and a small (7 to 12 acres) amount of habitat would be altered. No mitigation measures are suggested for this species except to avoid areas with moist, talus slopes under a dense canopy.

Indirect and Cumulative Effects

A single specimen of Chalk Maple and several Nevius' Stonecrop plants are located on the siliceous bluff on the north side of Hwy. 64. These plants are outside of the venue but could be affected by people climbing the cliff to get a view of the river. In order to protect these species the ditch and cliff on the north side of the road and in the vicinity of the venue should be fenced off from the public during the events.

Occurrences of other sensitive plants that are located outside of the venue include: Chalk Maple, Nevius' Stonecrop, Mountain Bush-honeysuckle, Southern Lobelia, Pink Lady's Slipper, Fraser's Loosestrife, Goldeneye Saxifrage, and Horse Sugar. All of these plants, especially those that have showy flowers, may be affected by increased tourist traffic. Flower picking and trampling may increase. In order to minimize these adverse effects signs designating the gorge as a sensitive botanical area will be erected at key points along Hwy 64. This mitigation measure is essential to the protection of the Endangered Ruth's Golden Aster (see attached Biological Assessment); by placing additional signs at sites not associated with the Ruth's Golden Aster, the public will become more aware of the sensitivity of the gorge.

10) Summary of Mitigation Measures

Mark the locations of all sensitive plants located within the venue. During the layout and construction of the facilities, the habitat around these plants should be protected from disturbances. Transplanting will be the last option considered.

Avoid areas with moist, talus slopes under a dense canopy.

The ditch and cliff on the north side of the road and in the vicinity of the venue should be fenced off from the public during the events.

Signs designating the gorge as a sensitive botanical area will be erected at key points along Hwy 64.

11) Consultation with Others and References

- Bettoli, Phillip W. 1993. Fish and Macroinvertebrates in the Ocoee River Below Dam No. 3. Engineering-Science, Inc.
- Cherokee National Forest TES List and Database Maps.
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- Shea, Andrea. 1993. Botanist with Tennessee Department of Environment and Conservation. Personal Communication.
- Whitehead, Clifton J. 1993. Wildlife Species of Polk Co., Tn. Tennessee Wildlife Resources Agency TABS Database.
- Widlak, Jim, Endangered Species Biologist, USDI Fish and Wildlife Service, Cookeville, TN.

11) Determination of Effect

The design and construction of a canoe and kayak whitewater course on the Ocoee River with the prescribed mitigation measures put into place will not effect the following Forest sensitive species: Chalk Maple, Cow-parsnip, Broadleaf Tickseed, Roan Mt. Rattlesnake-root, Southern Lobelia, No. Bush-honeysuckle, Mt. Bush-honeysuckle, Mt. Honeysuckle, Catch-fly, Nevius' Stonecrop, Large Cranberry, Bush Pea, Giant Hyssop, Southern Nodding Trillium, Pink Lady's Slipper, Fraser's Loosestrife, Choke Cherry, Goldeneye Saxifrage, Horse-sugar, American Osprey, Tennessee Dace, Star-nosed Mole, Hairy-tailed Mole, Southern Water Shrew, New England Cottontail Rabbit, Least Weasel, and Ocoee Covert Snail. No other Sensitive species occur within the project area.

/s/ J.Herrig

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